By the decision of the General Committee to the Croatian Register of Shipping,

RULES FOR THE CLASSIFICATION OF SHIPS
Part 1 – GENERAL REQUIREMENTS
edition January 2020

have been adopted on 20th December 2019 and shall enter into force on 1st January 2020
# Contents:

Chapter 1  **GENERAL INFORMATION**  
1  THE RULES  
2  DEFINITIONS  
3  CLASSIFICATION SURVEY  
4  CLASS NOTATIONS  
5  CLASSIFICATION PROCEDURE  
6  APPLICATION OF STATUTORY REQUIREMENTS  
7  EXTERNAL AUDITS / INSPECTIONS  

Chapter 2  **SURVEY DURING CONSTRUCTION AND INITIAL SURVEY**  
1  SURVEY DURING CONSTRUCTION  
2  INITIAL CLASS ENTRY SURVEY OF EXISTING SHIPS - ADMISSION TO CLASS  

Chapter 3  **TYPE APPROVAL OF PRODUCTS**  
1  GENERAL INFORMATION  
2  TYPE APPROVAL  

Chapter 4  **APPROVAL OF MANUFACTURERS, AND SERVICE SUPPLIERS**  
1  APPROVAL OF MANUFACTURERS  
2  APPROVAL OF SERVICE SUPPLIERS  

Chapter 5  **SURVEYS OF SHIPS IN SERVICE**  
1  GENERAL REQUIREMENTS  
2  TYPE OF SURVEYS  
3  PREPARATIONS, CONDITIONS AND DOCUMENTATION FOR SURVEY  
4  ANNUAL SURVEY  
5  INTERMEDIATE SURVEY  
6  BOTTOM SURVEY  
7  RENEWAL SURVEY  
8  RENEWAL SURVEY REQUIREMENTS FOR MACHINERY  
9  SURVEY OF THE AUTOMATION SYSTEMS  
10  PROPELLER AND PROPELLER SHAFT SURVEY  
11  ELECTRICAL EQUIPMENT  
12  REFRIGERATING PLANT  
   ANNEX A - Hull Surveys of Chemical Tankers  
   ANNEX B - Hull Surveys of Double Hull Oil Tankers  
   ANNEX C1 - Hull Surveys of Single Skin Bulk Carriers  
   ANNEX C - Hull Surveys of Double Skin Bulk Carriers  
   ANNEX D - Sketches
REVIEW OF AMENDMENTS IN RELATION TO PREVIOUS EDITION OF THE RULES

RULES FOR THE CLASSIFICATION OF SHIPS
Part 1 - GENERAL REQUIREMENTS
Chapter 1 – General information

All major changes in respect to Rules for the classification of ships, Part 1 – General requirements, Chapter 1 – General information, edition January 2019, throughout the text are shaded (if any).

Items not being indicated as corrected have not been changed.

The grammar and print errors, have been corrected throughout the Rules and are not subject to above indication of changes.
The subject Chapter of this part of the Rules includes the requirements of the following international Organisations:

**International Association of Classification Societies (IACS):**

**Unified Requirements (UR):**
- L2 (April 2013, rev. 2), Z7 (June 2016, rev. 25), Z11 (2015, rev. 5)

**Procedural Requirements (PR):**

**Unified Interpretations (UI):**
- HSC9 (corr. 1, Jan 2014), LL78 (corr. 1, Jan 2014), SC256 (June 2012), SC261 (May 2013), MPC100 (June 2012), MPC104 (corr. 1, Jan 2014)
Chapter 1  GENERAL INFORMATION

Contents:

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>THE RULES</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>DEFINITIONS</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>CLASSIFICATION SURVEY</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>CLASS NOTATIONS</td>
<td>8</td>
</tr>
<tr>
<td>4.1</td>
<td>GENERAL PROVISIONS</td>
<td>8</td>
</tr>
<tr>
<td>4.2</td>
<td>HULL</td>
<td>8</td>
</tr>
<tr>
<td>4.3</td>
<td>MANDATORY SHIP TYPE AND ENHANCED SURVEY PROGRAMME (ESP) NOTATIONS</td>
<td>14</td>
</tr>
<tr>
<td>4.4</td>
<td>MACHINERY INSTALLATION</td>
<td>19</td>
</tr>
<tr>
<td>4.5</td>
<td>REFRIGERATING PLANT</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>CLASSIFICATION PROCEDURE</td>
<td>25</td>
</tr>
<tr>
<td>5.1</td>
<td>REQUEST FOR CLASSIFICATION</td>
<td>25</td>
</tr>
<tr>
<td>5.2</td>
<td>ISSUING OF THE CERTIFICATE OF CLASS</td>
<td>25</td>
</tr>
<tr>
<td>5.3</td>
<td>MAINTAINING THE VALIDITY OF CERTIFICATE OF CLASS</td>
<td>25</td>
</tr>
<tr>
<td>5.4</td>
<td>PERIOD OF VALIDITY</td>
<td>26</td>
</tr>
<tr>
<td>5.5</td>
<td>EXTENSION OF THE PERIOD OF VALIDITY</td>
<td>26</td>
</tr>
<tr>
<td>5.6</td>
<td>SUSPENSION AND REINSTATEMENT OF CLASS IN THE CASE OF OVERDUE SURVEYS</td>
<td>27</td>
</tr>
<tr>
<td>5.7</td>
<td>WITHDRAWAL OF CLASS</td>
<td>28</td>
</tr>
<tr>
<td>5.8</td>
<td>NOTIFICATION TO THE OWNERS AND FLAG STATES</td>
<td>28</td>
</tr>
<tr>
<td>5.9</td>
<td>SUSPENSION AND REINSTATEMENT OF CLASS IN THE CASE OF OVERDUE RECOMMENDATIONS / CONDITIONS OF CLASS</td>
<td>28</td>
</tr>
<tr>
<td>5.10</td>
<td>DOUBLE CLASSED VESSELS</td>
<td>28</td>
</tr>
<tr>
<td>5.11</td>
<td>SUSPENSION AND REINSTATEMENT OF CLASS IN THE CASE OF DULLY CLASSED VESSELS</td>
<td>28</td>
</tr>
<tr>
<td>5.12</td>
<td>REGISTER BOOK</td>
<td>29</td>
</tr>
<tr>
<td>5.13</td>
<td>ASSIGNING THE DATE OF BUILD</td>
<td>29</td>
</tr>
<tr>
<td>5.14</td>
<td>DATE OF CONTRACT FOR CONSTRUCTION</td>
<td>29</td>
</tr>
<tr>
<td>5.15</td>
<td>DATE OF INITIAL CLASSIFICATION</td>
<td>30</td>
</tr>
<tr>
<td>5.16</td>
<td>DATE OF DELIVERY UNDER SOLAS AND MARPOL CONVENTIONS</td>
<td>30</td>
</tr>
<tr>
<td>5.17</td>
<td>KEEL LAYING DATE</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>APPLICATION OF STATUTORY REQUIREMENTS</td>
<td>31</td>
</tr>
<tr>
<td>7</td>
<td>EXTERNAL AUDITS / INSPECTIONS</td>
<td>32</td>
</tr>
</tbody>
</table>
1 THE RULES

1.1 Rules for the classification of ships (hereafter referred to as: the Rules) developed by the CROATIAN REGISTER OF SHIPPING (hereafter referred to as: the Register) are prescribing requirements for classification of ships on the basis of internationally adopted maritime standards.

1.2 The Rules are divided into parts, and exceptionally Part 1 is furthermore divided into chapters (see Figure 1.2-1).

Parts of the Rules (or Chapters for Part 1) are divided in sections, heads, items and sub-items. For this purpose a maximum of six digit decimal system has been adopted throughout, e.g.:

- indicates section number
- indicates head number
- indicates item number
- indicates sub-item number

X.X.X.X

Title numbers of Parts of the Rules (and Chapters for Part 1) are given in page headers.

The cross-referencing within the text is as follows:

1.1 If the text is in the same Part and in the same Chapter of the Rules, e.g. see requirements in 3.4.2.1 (i.e. down to sub-item number).

1.2 If the text is in the same Part, but in different Chapter of the Rules, e.g. see requirements as stated in the Rules, Chapter 2 - Survey during construction and initial survey, 4.1 (i.e. down to head number).

1.3 If the text is in the Rules, but in another Part of the Rules, e.g. see requirements as stated in the Rules, Part 25 – Metallic materials, 2.3 (i.e. down to head number).

The cross-reference for Figures, Tables and Formulas is as follows:

1.1 If the Table (Formula or Figure) is in the same Part and in the same Chapter of the Rules, e.g. as shown in Table 3.4.2-1 (table number is composed of section number (3), head number (4), item number (2) and table number (1)).

1.2 If the Table (Formula or Figure) is in the same Part, but in different Chapter of the Rules, e.g. as shown in the Rules, Chapter 1 - General information, Table 4.2.2-1.

1.3 If the Table (Formula or Figure) is in the Rules, but in another Part of the Rules, e.g. as shown in the Rules for tonnage measurement of sea-going ships, boats and yachts, 2.

Scope of the Rules

1.3 The Rules are applicable, with no consideration of navigation area, to:

- New ships.
- Existing cargo ships, with no consideration of date of built if converted in passenger ships.
- Existing ships, in cases of significant repairs, modifications, reconstruction or alternations of the equipment, as well as, when the purpose of the ship, navigation area or number of the passengers which the ship is allowed to carry has been changed, in extent deemed necessary by the Register considering each case separately.
- Existing ships, except for those stated in 1.3.2 and 1.3.3, solely if it is explicitly specified in the Rules.
- Floating units and technical floating units, in extent as deemed necessary by the Register considering each specific case separately.

1.4 The Rules are prescribing adopted standards for design, construction and maintenance related to:

- Structural strength and where necessary the watertight integrity of all essential parts of hull and its appendages.
- Safety and reliability of the propulsion and steering system and those features and auxiliary systems for establishing and maintaining basic conditions on board.

In addition to the above mentioned the Rules are prescribing requirements related to:

- Stability.
- Subdivision (additional notation).
- Fire protection.
- Refrigerating plant.

1.5 The Rules are not applicable to:

- Mobile offshore drilling units.
- Liquefied gas carriers.
- Tankers for oil comprised with Condition Assessment Scheme (CAS) according to IMO Res. MEPC.94(46), as amended.

1.6 During Initial survey (first classification survey for the purpose of admission to class) of the existing ship, which has not been surveyed during construction by the Register, the following should be applied:

- Requirements of the Rules of the classification society which supervised the ship during construction.
- Requirements of the Rules of the losing classification society.
- Requirements of the Rules of the Register which are related to existing ships.

NOTE: Apart from classification requirements, during Initial survey of the existing ship, the Register may also verify compliance of the ship with relevant statutory requirements, if so authorized by the Flag State Administration.
1.7 Compliance with the class related requirements as stated in the Rules does not relieve the Owner (Company), or any other interested party from compliance with any statutory requirement demanded by the Flag State Administration.

In the case of fittings, appliances, details or general finish of the ship, not covered by the Rules, but specially demanded by the Owner, the Register does not bear any consequences for possible discrepancy of such demands with Flag State Administration statutory requirements.

Adoption of the Rules

1.8 Rules are adopted by the General Committee of the Register on the basis of the decision of the Technical Committee.

1.9 If not explicitly stated otherwise, the new Rules, as well as the amendments to existing Rules, shall enter into force, after they have been adopted by the General Committee of the Register, on the date indicated on the inside page of the Rules or in the relevant Chapter of the Rules.

As a general rule, the Rules are printed either in English, or in Croatian. Notwithstanding before stated, in cases of dispute, and when the Rules are exceptionally printed both in English and Croatian, English version should have precedence and should be taken as the relevant one, while the Croatian version should be considered as a translation only.

Application of the Rules

1.10 The applicable Rules for the assignment of class to a newbuilding are those being in force at the date of contract for construction, as specified in the "Request for survey during construction" (for the definition of date of contract for construction see 5.14).

Above stated is also applicable to existing ships when undergoing major conversions, or to the altered part of the ship in the case of partial alterations.

1.11 For ships in service requirements of the Rules related to class assignment, maintenance and withdrawal of class, are applicable from the date of their entry into force and are determined by the assigned main characters of class.

NOTE: For the purpose of the application of SOLAS and MARPOL regulations for newbuildings and ships in service refer to IMO MSC-MEPC.5/Circ.8 (Unified interpretation of the application of regulations governed by the building contract date, the keel laying date and the delivery date for the requirements of the SOLAS and MARPOL Conventions). For the definition date of delivery and keel laying date under SOLAS and MARPOL Conventions see 5.16 and 5.17 respectively.

Interpretation of the Rules

1.12 Competent interpretations of the requirements stated in the Rules, or in any other regulation published by the Register, are exclusively in jurisdiction of the Head Office, regardless of other possible interpretations of surveyors in the Branch offices.

In cases where detailed requirements are not given in the Rules, specific approval by the Register is to be based on the principles of the Rules, and is to give a safety standard equivalent to that of the Rules.

1.13 In general, criteria of the equivalence is applicable for the requirements of the Rules and according to that, any other mode or method of surveys, examinations, calculations or production processes equivalent to those stated in the Rules may be accepted.

Acceptance of the above mentioned criteria is exclusively in jurisdiction of the Head Office and its approval in some cases may be subjected to special conditions.

Objections against conclusions and interpretations of the Register

1.14 Any objections against the line adopted by any of the Register’s servants in fulfilling their duties or against the conclusions reached are to be raised to the Register by the interested party as soon as possible.

If interested parties are not satisfied with the final conclusions and interpretations by the Register the final arbitration lays upon the Commission for appeal for classification and statutory certification of ships, which is to be formed according to the regulation 39 of the Charter of the Register.
Figure 1.2-1
Graphic layout of the Rules for the classification of ships

NOTE:
* Until publication of subject Parts of the Rules as classification rules corresponding Chapters of the Rules for statutory certification of ships made of wood, aluminium alloys and reinforced plastics and corresponding Chapters of the Rules for statutory certification of fishing vessels shall apply.
2 DEFINITIONS

2.1 IMO - International Maritime Organisation.

2.2 IACS - International Association of Classification Societies.

2.3 Classification - in general it comprises all the activities and services rendered by the Register in accordance with the Rules.

Classification of ships is conducted in accordance with the Rules and any other standards to which reference therein may be made.

2.4 Class term - period of validity of the Certificate of class, i.e. time interval between two Renewal surveys (time interval may be up to 5 (five) years and depends upon the navigation area, building material, general condition, age, etc.).

2.5 Certificate of class - certificate which proves compliance with the requirements of the Rules. In the Certificate of class are stated all main and additional characters of class assigned by the Register, including descriptive notes and service restrictions, if any.

2.6 Statutory certificates - certificates issued under provisions of different IMO instruments (e.g. SOLAS 74, MARPOL 73/78, ILLC 66) or some other national certificates issued by the Flag State Administration or on its behalf.

2.7 Maritime Administration or Flag State Administration - the Administration of the Government of the State whose flag the ship is entitled to fly.

2.8 To the satisfaction of the Administration - as in various documents such interpretations are vaguely worded, the Register shall, when acting on behalf of a Flag State Administration, follow guidance issued by IMO (Resolutions, Circulars, etc.), or by IACS through Unified Interpretations (UI), unless Flag State Administration has instructed otherwise.

2.9 To the satisfaction of the Register - expresses the state that corresponds to the requirements of the Rules or additional requirements imposed by the Register.

2.10 At the discretion of the Surveyor - expresses that the opinion of the Surveyor responsible for the survey or testing shall be considered competent.

2.11 Additional requirements - requirements not provided for by the Rules, but imposed by the Register during the survey.

2.12 Condition of class - a requirement to the effect that specific measures, repairs, surveys, etc. are to be carried out within a specific time limit in order to retain class.

2.13 Recognized classification society - IACS member classification society having valid agreement on mutual cooperation with the Register.

2.14 Recognised organisation (RO) - organisation being authorised to act on behalf of the Flag State Administration of the Government of the State whose flag the ship is entitled to fly.

2.15 The Owner - party having requested classification or having assumed ownership of a classed ship. In cases where owners have authorised another party to operate the ship on their behalf, such party is regarded as the Company.

2.16 Product - machinery, arrangement, equipment, devices, outfit, as well as their parts and materials to which the requirements of the Rules are applicable while manufacturing.

2.17 Ship - a floating unit intended for sea-going service with length greater than 12 meters and with gross tonnage greater than 15, or which carries more than 12 passengers. The term ship comprises the following: passenger ships, cargo ships, technical floating units, fishing vessels, ships used by Authorities and research ships. The present definition does not apply to ships of war and troopships.

2.18 Passenger ship - a self-propelled ship with permission to carry more than 12 passengers.

2.19 Cargo ship - a ship intended for the transport of cargo, with or without mechanical propulsion.

2.20 Self-propelled ship - a ship with mechanical means of propulsion not requiring assistance from another ship during normal operation.

2.21 Fast ship - a ship capable of achieving maximum speed in knots equal to or exceeding:

\[
V = \frac{7.1922}{0.1667} \quad (2.21-1)
\]

where \( V \) is displacement corresponding to the design waterline in [m³], excluding vessel the hull of which is supported completely clear above the water surface in non-displacement mode by aerodynamic forces generated by ground effect.

This comprises the following:

1. High-speed craft (HSC) - a craft complying with the requirements of IMO Res. MSC.36(63) or IMO Res. MSC.97(73), in their up-to-date versions and capable of achieving maximum speed in knots equal or exceeding the value calculated from the formulae 2.21-1. High speed (HSC) crafts can be divided as follows:

   - Category A craft - a high-speed passenger craft as defined in Chapter 1, item 1.4.12 of the HSC Code,

   - Category B craft - a high-speed passenger craft as defined in Chapter 1, item 1.4.13 of the HSC Code,

   - Cargo craft - a high-speed craft other than passenger craft as defined in Chapter 1, item 1.4.10 of the HSC Code.

2. Dynamically supported craft (DSC) - a craft complying with the requirements of IMO Res. A.373(X) as amended, i.e. a craft which is operable on or above water and which has characteristics different from conventional displacement ships.
Within aforementioned generality, a craft which complies with either of the following characteristics would be considered a dynamically supported craft:
- its weight, or significant part thereof, is balanced in one mode of operation by other than hydrostatic forces,
- craft capable of achieving maximum speed in knots equal or exceeding the value calculated from the formulae 2.21-1.

Among others, the aforementioned includes mono-hull or multi-hull crafts such as:
- **Hydrofoil** – a non-displacement craft which is supported above the water surface by hydrodynamic forces generated by foils.
- **Surface Effect Ship - SES** – an air-cushion vehicle whose air-cushion is partially or completely preserved by permanently immersed hard elements of the hull.

.3 **Fast craft** - a craft not being High-speed craft (HSC) or Dynamically supported craft (DSC) but capable of achieving maximum speed in knots equal or exceeding the value calculated from the formulae 2.21-1.

.4 **Air Cushion Vehicle (ACV)** - a craft such that the whole or a significant part of its weight can be supported, whether at rest or in motion, by a continuous generated cushion of air dependent for its effectiveness on the proximity of the surface over which the craft operates and compliant with the requirements of the Rules, Part 28 - High speed craft.

**NOTE:** A high speed passenger ship engaged on domestic voyages means a high speed craft as defined in Reg. XI/I of SOLAS 74, as amended, which carries more than 12 passengers, with the exception of passenger ships engaged on domestic voyages in sea areas of Class B, C or D (according to EU Directive 2009/45/EC, as amended) when:
- their displacement corresponding to the design waterline is less than 500 m³, and
- their maximum speed, as defined in Reg. 1.4.30 of the 1994 High Speed Craft Code (IMO Res. MSC.36(63)) and Reg. 1.4.38 of the High Speed Craft Code (IMO Res. MSC.97(73), as amended), is less than 20 knots.

**NOTE:** Maximum speed, as defined in 1.4.38 of the Rules, Part 28 - High speed craft (and in Reg. 1.4.30 of the 1994 High Speed Craft Code (IMO Res. MSC.36(63)), as well as in Reg. 1.4.38 of the High Speed Craft Code (IMO Res. MSC.97(73), as amended), is "the speed achieved at the maximum continuous propulsion power for which the ship is certified at maximum operational weight and in smooth water".

**2.22** **Modification** or **conversion** on the existing ship:

.1 which substantially alters the dimensions of the ship, or
.2 which substantially alters carrying capacity of the ship; or
.2 which changes the type of the ship, or which changes engine power or type of propulsion; or
.3 the intent of which is substantially to prolong life of the ship; or
.4 which otherwise so alters the ship that it becomes reasonable to apply requirements as if it were a new ship, or

.6 which changes the navigation area of the ship, or
.7 which changes the maximum allowable number of passengers on the ship.

Repair or substitution of the elements (components) with the identical elements (components) or restored with original design and scantlings is not to be considered as a modification.

**NOTE:** For the purpose of application of certain IMO instruments (e.g. SOLAS 74, MARPOL 73/78, ILLC 66) the term "conversion" may be defined differently than above.

**2.23** **Open type passenger ship** - a ship carrying more than 12 passengers and declared as such by the Flag State Administration and which is:
.1 Not fitted with a watertight weather deck, or
.2 Fitted with a watertight deck over the part of its length, or
.3 Fitted with a watertight deck over the whole of its length, but the freeboard to the deck does not meet the minimum requirement for the freeboard assignment.

The following general restrictions shall apply to open type passenger ship:

a) Classification services cannot be granted for performing international voyages.
b) Classification services can be granted for restricted service in sheltered and enclosed sea areas only (navigation area 7 and navigation area 8).
c) Classification services cannot be granted if its maximum speed is equal to or exceeding 20 knots, as defined in 1.4.38 of the Rules, Part 28 - High speed craft.

**NOTE:** Classification services cannot be granted if its maximum speed is equal to or exceeding 20 knots, as defined in 1.4.38 of the Rules, Part 28 - High speed craft.
3 CLASSIFICATION SURVEY

Classification survey

3.1 Classification survey is comprising a set of activities during which the ship (or other floating unit) is surveyed during construction on the basis of design approval, tested before being taken into service, and surveyed regularly during its whole operational life, until it is laid-up or scrapped.

Classification covers ship's hull, machinery installations (including electrical installations) and related equipment.

The aim of the classification survey is to verify that the required Rules standards regarding maintenance of the ship, its equipment, electrical and machinery installations are applied, with a special consideration to the navigation area and service of the ship.

3.2 Structural systems and equipment determining the ship type, are subjected to examination within the scope of classification only if the type of the ship is specified in the class notation.

Nevertheless, if structural system and equipment has impact to the safety of ship itself, human life, property at sea or to sea environment, the Register reserves the right to extend the scope of classification survey to such items.

Certain installations may be classed separately (e.g. refrigerating installations), and therefore are subjected to classification survey also.

3.3 Activities and requirements concerning classification survey are stated in relevant Parts of the Rules.

3.4 Shipyards, manufacturers, shipowners, etc. are to provide safe access and necessary facilities for the Surveyors while performing classification survey. In addition to that, shipyards, manufacturers, shipowners, etc. are responsible for the organisation of the survey in prescribed time schedules.

3.5 In general, classification survey is performed by the Surveyors of the Register.

If deemed necessary and reasonable by the Register, performing of classification survey may be entrusted to other recognised organization (RO), in accordance with the agreement on mutual cooperation between the Register and that RO.

No certificates, statements or attestations with regard to compliance of technical facts or products with the Rules of the Register shall be given or issued by any entity other than the Register.

Statement or attestation given or certificate issued by the Register shall not release the Owner, Company, manufacturer, etc. from his contractual obligations towards third parties.

3.6 After completing the survey during construction or alteration, or after completing any survey of materials or products, no alteration on the ship construction, machinery installation, equipment or other parts, to which the requirements of the Rules are applicable, is to be carried out without permission of the Register.

If certain arrangements or equipment of the ship are out of order, and consequently not being in use, and if they have no major influence on the safety of life, property at sea and protection of the sea environment, i.e. if such equipment not being required by the Rules, they are to be permanently removed from the ship. Exceptionally, the Register may not require their removal under condition that on such arrangements or equipment it is clearly posted (locally and in control room) that they are not being in use.

3.7 Classification surveys are not performed as a substitute for the Owner's, Company's or any other party's own quality and safety control of the ship, or their obligations to third parties, nor to relieve them of any responsibilities for not maintaining the ship in good and seaworthy manner.

The Owner is to ensure that the condition of the ship and maintenance of its equipment is such that the ship is in any case capable for navigation with no hazards for the ship, personnel, passengers, cargo and the environment, as it is stated by the Rules.

Therefore, the Rules, classification surveys performed, reports, certificates and other documents issued by the Register, are in no way intended to replace or alleviate the duties and responsibilities of other parties such as actual or prospective owners or operators, charters, brokers, cargo-owners, underwriters, Flag State Administrations, Port State Controls, designers, shipbuilders, manufacturers, repair yards or suppliers.

3.8 Classification survey of existing ships is performed on the basis of a request submitted by the Owner or his representative.

3.9 It is the responsibility of the Owner (or the Company) to ascertain the presence of his representative while surveys of existing ships are performed.

3.10 While performing surveys of existing ships, i.e. during surveys of the parts or systems of the ship, the extent of the survey may be enlarged if there are reasonable doubts as to accuracy or reliability of surveyed parts or systems, as well as in the cases of additional requirements imposed by the Register.

Obligations of the Owner

3.11 The Owner, Company or the Master of the ship is to notify the Register immediately:

.1 When docking a ship.
.2 In cases of changing the purpose of a ship, conversion and alteration to the hull, machinery installations and other equipment influencing the class of the ship assigned by the Register. Conversions and alternations are to be performed under the Surveyor's supervision, and are to be in accordance with the requirements of the Rules and/or additional requirements of the Register.
.3 In cases when parts of the ship's structure normally difficult to access are exposed, (e.g. when any part of the main or auxiliary machinery, including boilers, insulation cement or wooden ceilings, etc. is removed). These activities are to be in ac-
cordance with the requirements of the Rules and/or additional requirements of the Register and under the Surveyor’s supervision.

.4 When the ship is put out of service or when the ship is laid-up.
.5 In cases of changing the name, changing the port of registry, changing the flag or selling the ship.
.6 In cases when the ship sustains damage of such extent that it is presumed that ship’s class is affected and that safety and integrity of the ship is endangered. In that case the ship is to be surveyed in the first port of call or according to further instructions from the Register. The survey is to be of the extent which the Register considers necessary taking into account the amount of the damage.
.7 In cases when class related deficiencies and/or defects are found as a result to Flag State inspection or Port State Control. Should the Owner or Company fails to inform the Register on detention of the ship by Port State Authorities due to class related deficiencies, the Register reserves the right to suspend or withdraw Certificate of class.

Confidentiality and disclosure of information

3.12 The Register keeps complete files on all ships classed by the Register.

The Register maintains confidentiality with respect to all documents and other kinds of information received in connection with the classification entrusted to it by the client.

The Register is obliged not to dispose documents or any other information concerning ship’s classification to third parties without prior consent of the client. However, this shall not apply to:

.1 the obligations the Register has towards the Flag State Administrations and other international organisations;
.2 the obligations the Register has towards legal requirements and international conventions;
.3 technical data of ships contained in the Register Book;
.4 status of ship surveys and certificates, in the scope and as defined in IACS PR3 - Transparency of Classification and Statutory Information;
.5 the obligations of the Register has towards the EU Commission regarding access to the information necessary for the purposes of the assessment referred to in Article 8(1) of the Regulation (EC) No. 391/2009 of the European Parliament and of the Council on common rules and standards for ship inspection and survey organisations.

Before mentioned, as far as applicable, applies to files related to approval of manufacturers, products, service suppliers or testing laboratories also.

3.13 The service of the Register is available to the Owner at any time when needed, in connection with reports on previously performed surveys, or commencing surveys, as well as with conditions for the classification.

3.14 After every performed survey the Register will send to the Owner a Report concerning conditions of class and related time limit for undertaking necessary repairs, improvements or other measures, i.e. time limit for adjusting the ship, equipment, machinery installations or other relevant arrangements and systems with the requirements of the Rules.

Spare parts

3.15 It is the Owner’s responsibility to decide whether and which spare parts will be carried on board. As spare parts are outside the scope of classification, they will not be checked during classification surveys, under presumption they are kept on board, maintained in satisfactory condition, or suitably protected and lashed. However, in the case of replacement, the spare parts used are to meet the requirements of the Rules as far as practicable.
4 CLASS NOTATIONS

4.1 GENERAL PROVISIONS

4.1.1 The Register will assign appropriate class notation to the ship which meets the requirements of the Rules.

Class notation consists of main and additional characters of class, which are denoting the degree of reliability that ship deserves as well as ship's main particulars.

Apart from class notation the Register reserves the right to add special descriptive note(s), as stated but not limited to ones in the following section.

The Register can assign class notation related to the following:

.1 Hull.
.2 Machinery installation.
.3 Refrigerating plant.

4.1.2 Class notation for hull comprises:

.1 Main character of class, comprising:
   a) character denoting survey during construction,
   b) character denoting quality of hull.

.2 Additional character of class, comprising as far as applicable:
   a) character denoting navigation area,
   b) character denoting ice strengthening category,
   c) character denoting ship type,
   d) character denoting constructional characteristics.

If for instance the Register assigns the following class notation for hull:

★ 100A1 1 (unrestricted service) 1B Tanker for oil ESP CREST SD, main character of class is: ★ 100A1, and additional characters of class are: 1 (unrestricted service) 1B Tanker for oil ESP CREST PW-CA SD (for further explanation see 4.2).

4.1.3 Class notation for machinery installation comprises:

.1 Main character of class, comprising:
   a) character denoting survey during construction,
   b) character denoting quality of machinery installation.

.2 Additional character of class, comprising as far as applicable:
   a) character denoting automation level,
   b) characters IGS and COW.

If for instance the Register assigns the following class notation for machinery installation:

★ M1 AUT 1 IGS COW, main character of class is: ★ M1, and additional characters of class are: AUT 1 IGS COW (for further explanation see 4.4).

NOTE: Class notation ★ 100A1 (for hull), ★ M1 (for machinery installation) and ★ R (for refrigerating plant) are to be considered the highest class notations that might be assigned by the Register.

4.1.4 Class notation for refrigerating plant comprises:

.1 Main character of class, comprising:
   a) character denoting survey during construction,
   .2 Additional character of class, comprising as far as applicable:
      a) character denoting ability of refrigerating plant.

If for instance the Register assigns the following class notation for refrigerating plant:

★ R + C, main character of class is: ★ R, and additional characters of class are: + C (for further explanation see 4.5).

4.1.5 In addition to any class notation, a descriptive note (or notes) may be added in the Certificate of class.

Descriptive note provides information regarding ship type in greater detail, special design assumptions, arrangements or equipment, which are not covered by main class or additional characters of class.

Descriptive note is not to be considered as a class notation, but as additional information only, and consequently in general is not subjected to provisions related to maintenance of class.

4.2 HULL

4.2.1 Main character of class for hull denoting survey during construction and when after construction is maintained in a condition considered satisfactory by the Register. One of the following characters:

★ - is to be assigned to a ship if:
   a) the hull has been built under survey and to the satisfaction of the Register in accordance with the Rules, or
   b) the hull has been built in accordance with the Rules, but under survey and to the satisfaction of another recognized classification society,

★ - the hull has been built under survey, in compliance with the rules and to the satisfaction of another recognized classification society.

[No symbol] - if the hull has been built without survey of the Register or any recognized classification society no symbol is assigned.

4.2.2 Main character of class denoting quality of hull. One of the characters of class stated in 4.2.2.1 or 4.2.2.2 is to be assigned. Class term for this character of class is 5 years.

4.2.2.1 One of the following characters for ship whose hull is made of metallic materials is to be assigned (for other related requirements see Table 4.2.2.1):

100A1 - is to be assigned to a ship intended for navigation area notations 1 and 2 if general condition found by survey fully complies with requirements of the Rules.

100A2 - is to be assigned to a ship intended for navigation area notations 1 and 2, but whose construction due to general condition found by survey do
not comply, or do not fully comply with requirements of the Rules.

90A1 - is to be assigned to a ship intended for navigation area notations 3 and 4 if general condition found by survey fully complies with requirements of the Rules.

90A2 - is to be assigned to a ship intended for navigation area notations 3 and 4, but whose construction due to general condition found by survey do not comply, or do not fully comply with requirements of the Rules.

50A1 - is to be assigned to a ship intended for navigation area notations 5, 6, 7 and 8 if general condition found by survey fully complies with requirements of the Rules.

50A2 - is to be assigned to a ship intended for navigation area notations 5, 6, 7 and 8, but whose construction due to general condition found by survey do not comply, or do not fully comply with requirements of the Rules.

4.2.2.2 One of the following characters for ship having hull made of non-metallic materials (wood, fibre reinforced plastics, ferro-cement, etc.) is to be assigned (for other related requirements see Table 4.2.2-1):

90B1 - to a ship intended for navigation area notations 3 and 4 if general condition found by survey fully complies with requirements of the Rules.

NOTE: In some exceptional cases, for ships having 90B1 character of class assigned, navigating area notation 1 or 2 may be affixed, considering each case separately.

90B2 - to a ship intended for navigation area notations 3 and 4, but whose construction due to general condition found by survey do not comply, or do not fully comply with requirements of the Rules.

50B1 - to a ship intended for navigation area notations 5, 6, 7 and 8 if general condition found by survey fully complies with requirements of the Rules.

50B2 - to a ship intended for navigation area notations 5, 6, 7 and 8, but whose construction due to general condition found by survey do not comply, or do not fully comply with requirements of the Rules.

4.2.3 Additional character of class denoting navigation area is a number which denotes permissible navigation area of the ship.

The Register may assign appropriate character denoting navigation area for the geographical areas different from those stated below, if the Register considers that the sea conditions, distance from the nearest coast, or distance from the nearest port of refuge are equivalent to the geographical areas stated below. In that case a geographical navigation area is added to the character denoting navigation area (e.g. 3 - Red Sea).

Also, geographical navigation area may be additionally restricted by stating the maximum distance from the nearest harbour or safe anchorage in nautical miles, and/or by the sea state conditions, which is to be indicated in the Certificate of class.

Observance of the navigation area restrictions and sea state conditions restrictions if any, is a prerequisite for maintaining the validity of the Certificate of class.

Characters denoting navigation area are:

1 - (unrestricted service) - international ocean-going service navigation in all seas and waters accessible from the sea.

2 - (great coastal service) - international navigation in the seas (and waters accessible from the sea) extending between Gibraltar and Bab el Mandeb straits, including the Black and Azov seas and out of Mediterranean sea to the ports of Lisbon and Casablanca in the Atlantic ocean, and the Red sea to the ports of Aden and Berbera.

3 - (short coastal service) - international navigation during which the ship shall navigate at the distance not more than 50 nautical miles from the nearest coast, land or island.

NOTE: For Croatian flagged ships this navigation area denotes navigation in the Adriatic sea and in part of the Ionian sea (and waters accessible from the sea) to the line connecting Cape Santa Maria di Leuca (including the port of Taranto) and the Cape of Catano (including the port of Catano), Ionian islands and bays: of Patras, of Corinith (including the Corinith channel) and of Athens up to the line connecting Cape of Kolona and Skiil.

4 - (coastal service) - international navigation during which the ship shall navigate at the distance not more than 20 nautical miles from the nearest coast, land or island.

NOTE: For Croatian flagged ships this navigation area denotes navigation through the Adriatic sea (and waters accessible from the sea) it means navigation up to the line connecting Cape of Santa Maria di Leuca and Cape Kefali on island Corfu and Cape of Scala (near Butrin bay). When planning the voyage between eastern and western coast of the Adriatic sea, the terms coast, land or island do not include coasts of islands Palagruza, Galuila, Pianosa, islands of Tremiti, island Sazan and coast of Albania from the Cape of Gjues (Sqiqi i Gjues) to the Cape of Panormes (Sqiqi i Panormes).

5 - (national service) - navigation in territorial sea and waters accessible from the sea, during which the ship shall navigate at the distance not more than 12 nautical miles from the nearest coast, land or island.

NOTE: For Croatian flagged ships this navigation area denotes internal sea water navigation and navigation in territorial sea of the Republic of Croatia and waters accessible from the sea.
.6 6 - (national coastal service)

NOTE: This navigation area is exclusively applicable for Croatian flagged ships.

6 - (national coastal service) - navigation in internal sea waters of the Republic of Croatia (and waters accessible from the sea) as prescribed by the Maritime Code of the Republic of Croatia. Within the time period from 1st April till 31st October this area is extended to:
- navigation within 1.5 nautical miles from the base line in direction of the economic line,
- navigation through Channel of Vis to islands of Vis and Biševo, then close to the said islands navigating at the distance not more than 1.5 nautical miles from their coasts.

.7 7 - (national coastal service in sheltered sea areas) - navigation in sheltered sea area of internal sea waters and waters accessible from the sea.

.8 8 - (service in enclosed sea areas) - navigation in ports, bays, river mouths and lakes.

4.2.4 Additional characters of ice class denoting ice strengthening category. Characters of class stated in 4.2.4.1 and 4.2.4.2 may be assigned.

4.2.4.1 Polar class. This character of class, as defined in 1.3.2 of the Rules, Part 29 - Polar Class Ships and Ice Class Ships, is to be assigned to a vessel intended for independent navigation in polar waters or ice-infested waters complying with the requirements of the Rules, Part 29 - Polar Class Ships and Ice Class Ships, Section 1 to Section 7.

PC 1 - ships capable of year-round operation in all polar waters.

PC 2 - ships capable of year-round operation in moderate multi-year ice conditions.

PC 3 - ships capable of year-round operation in second-year ice which may include multiyear ice inclusions.

PC 4 - ships capable of year-round operation in thick first-year ice which may include old ice inclusions.

PC 5 - ships capable of year-round operation in medium first-year ice which may include old ice inclusions.

PC 6 - ships capable of summer/autumn operation in medium first-year ice which may include old ice inclusions.

PC 7 - ships capable of summer/autumn operation in thin first-year ice which may include old ice inclusions.

4.2.4.2 Ice class. This character of class, as defined in 1.3.3 of the Rules, Part 29 - Polar Class Ships and Ice Class Ships, is to be assigned to a vessel complying with the requirements of the Rules, Part 29 - Polar Class Ships and Ice Class Ships, Section 8.

IAS - ships with such structure, engine output and other properties that they are normally capable of navigating in difficult ice conditions without the assistance of icebreakers.

IA - ships with such structure, engine output and other properties that they are capable of navigating in difficult ice conditions, with the assistance of icebreakers when necessary.

IB - ships with such structure, engine output and other properties that they are capable of navigating in moderate ice conditions, with the assistance of icebreakers when necessary.

IC - ships with such structure, engine output and other properties that they are capable of navigating in light ice conditions, with the assistance of icebreakers when necessary.

ID - ships that have a steel hull and that are structurally fit for navigation in the open sea and that, despite not being strengthened for navigation in ice, are capable of navigating in very light ice conditions with their own propulsion machinery.

4.2.5 Additional character of class denoting ship type. One of the characters of class stated in 4.2.5.1 to 4.2.5.22 is to be assigned.

To ships with type notation Tanker for oil, Product carrier, Chemical tanker, Bulk carrier, Ore carrier, Ore/oil carrier or OBO carrier which are subjected to the requirements of the Enhanced Survey Program, as stated in the Rules, Part 1 – General requirements, Chapter 5 - Surveys of ships in service, 3, 5 and 7, in addition to type notation the notation ESP shall be affixed (see also 4.2.5.5, 4.2.5.6 and 4.2.5.8). For the ships engaged in the international voyages (character denoting navigation area 1, 2, 3 and 4) type notation of the ship is to be entered in the Certificate of class in English, and for all other ships in Croatian.

Exceptionally, for the ships not engaged in international voyages, and not flying Croatian flag, class notation is to be entered in English.

Below stated type notations in English are given in bold, while equivalent type notations in Croatian are given in bold-italic.

4.2.5.1 Passenger ships

Passenger ship (Putnički brod) - a self-propelled ship with a permission to carry more than 12 passengers, specially designed and equipped for that purpose, with a single or multi-deck hull and superstructure, and with or without cabin accommodation for passengers.

If a passenger ship complies with the requirements of IMO Res. A.373(X), as amended (i.e. if a ship is considered to be Dynamically supported craft), the following descriptive note is to be entered into the Certificate of class:

"Dynamically supported passenger craft"

Passenger ship HSC (Putnički brod HSC) - a passenger ship complying with the requirements of the Rules, Part 28 - High speed craft (see 4.2.5.11).

Ro-Ro passenger ship (Ro-ro putnički brod) - a passenger ship provided with additional decks in the hull for
the carriage of vehicles, which embarks and disembarks on their own wheels, access to which is by side/stern/bow ramps.

4.2.5.2 General cargo ships

General cargo ship (Brod za opći teret) - a ship intended for the carriage of general cargo which will not be carried in containers.

4.2.5.3 Ro-Ro ships

Ro-Ro cargo ship (Ro-ro teretni brod) - a ship specifically designed for the carriage of vehicles, which embarks and disembarks on their own wheels, and/or goods on pallets or in containers, which can be loaded or unloaded by means of wheeled vehicles.

4.2.5.4 Multipurpose ships

Multipurpose ship is a ship specifically designed and equipped for carriage of different kinds of cargo such as general cargo, containers, cars, bulk cargo, etc. Assigned character of class depends on combination of ship’s purposes.

4.2.5.5 Bulk carriers

Bulk carrier (Brod za rasuti teret) - see 4.2.2.2.

For bulk carriers contracted for new construction on or after 1st July 2003, having a length of 150 m or above, and additionally complying with the Rules, Part 2 - Hull, 17.4.6 the following additional characters of class may be affixed, depending on the loading conditions, filling ratios of the cargo holds, etc.:

- BC-A - for bulk carriers designed to carry dry bulk cargoes of cargo density of 1.0 t/m³ and above with specified holds empty at maximum draught in addition to BC-B conditions.
- BC-B - for bulk carriers designed to carry dry bulk cargoes of cargo density of 1.0 t/m³ and above with all cargo holds loaded in addition to BC-C conditions.
- BC-C - for bulk carriers designed to carry dry bulk cargoes of cargo density less than 1.0 t/m³.

Depending on the limitations to be observed during operation as a consequence of the design loading conditions applied during the design phase, the following additional characters of class may be affixed:

- {no MP} - for bulk carrier having additional characters of class BC-A, BC-B and BC-C when the vessel has not been designed for loading and unloading in multiple ports in accordance with the conditions specified in Rules, Part 2 - Hull, 17.4.6.
- {maximum cargo density ... t/m³} - for bulk carrier having additional characters of class BC-A and BC-B if the maximum cargo density is less than 3.0 t/m³.
- {holds a, b, ... may be empty} - allowed combination of empty holds for bulk carrier having additional character of class BC-A.
- GRAB [X] - additional character of class for bulk carriers having one of the additional characters of class BC-A or BC-B and unladen grabs weight X equal to or greater than 20 tons. For these ships the requirements for the this character of class are specified in Rules, Part 2 - Hull, 17. For all other ships this additional character of class is not mandatory.

CSR - additional character of class to be assigned to bulk carrier complying with IACS Common Structural Rules.

SELF-UNLOADERS - additional character of class to be assigned to bulk carrier 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 (see 4.3.2.2.2).

NOTE: For existing bulk carriers, already classed by the Register and complying with IACS Common Structural Rules, as an equivalent, and instead of CSR character of class, the following descriptive note may be entered into the Certificate of class:

"Ship compliant with IACS Common Structural Rules (CSR)"

Ore carrier (Brod za rudaču) - see 4.3.2.3.1.

Self-Unloading Bulk Carrier - a ship intended to carry and self-unload dry cargoes in bulk.

4.2.5.6 Combination carriers

Combination carrier - see 4.3.2.4.1. This term comprises:

- Ore/oil carrier (Brod za rudaču / ulje) - see 4.3.2.4.2.
- OBO carrier (Brod za ulje / rasuti teret / rudača) - see 4.3.2.4.3.

4.2.5.7 Container ships

Container ship (Kontejnerski brod) - a ship specially designed and equipped with the appropriate facilities for carriage of containers.

4.2.5.8 Cement carriers

Cement carrier (Brod za cement) - a ship intended for carriage of cement in bulk with no weather deck hatches, but pumping and piping arrangements for the loading and unloading of cement.

4.2.5.9 Tankers

Tanker for non-toxic liquid cargo (Tanker za neškodljivi tekući teret) - a ship intended to carry in bulk non dangerous/non-toxic liquids (such as wine, water, vegetable or animal oils, etc.).

Tanker for oil (Tanker za ulje) - see 4.3.2.1.1.

If an oil tanker is intended exclusively for carriage of liquid cargo with flash point above 60 °C (closed cup test), the following descriptive note is to be entered into the Certificate of class:

"Not intended for carriage of liquid cargo having flash point below 60 °C (closed cup test)"

NOTE: For the purpose of classification, an oil tanker is to be considered as a double hull oil tanker when it has been constructed primarily for the carriage of oil in bulk (cargoes declared in MARPOL 73/78, Annex I), having 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.
**CSR** - additional character of class to be assigned to oil tanker complying with IACS Common Structural Rules.

**NOTE:** For existing oil tankers, already classed by the Register and complying with IACS Common Structural Rules, as an equivalent, and instead of CSR character of class, the following descriptive note may be entered into the Certificate of class:

"Ship compliant with IACS Common Structural Rules (CSR)"

**Product carrier (Tanker za preradevine)** - oil tanker intended for carriage of oil products, excluding crude oil.

**Chemical tanker (Tanker za kemikalije)** - self-propelled ship constructed generally with integral tanks and intended primarily to carry chemicals in bulk, i.e. carriage of any liquid product listed in IBC Code (International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk), Chapter 17. See 4.3.2.5.1 also.

When a chemical tanker complies with the requirements of IBC Code, Chapter 2, item 2.6.1.1, the following descriptive note is to be entered into the Certificate of class:

"Chemical tanker – Type 1"

When a chemical tanker complies with the requirements of IBC Code, Chapter 2, item 2.6.1.2, the following descriptive note is to be entered into the Certificate of class:

"Chemical tanker – Type 2"

When a chemical tanker complies with the requirements of IBC Code, Chapter 2, item 2.6.1.3, the following descriptive note is to be entered into the Certificate of class:

"Chemical tanker – Type 3"

**4.2.5.10** Refrigerated cargo ships

**Refrigerated cargo ship (Brod za rashladeni teret)** - a ship (excluding liquefied gas carriers and fishing vessels) specially intended to carry permanently refrigerated cargoes and having fixed refrigerating installations and insulated holds.

**4.2.5.11** High-speed crafts

**HSC** - high speed craft meeting the requirements of the Rules, Part 28 – High speed craft.

For a passenger ship defined as “Category A craft” in respect to the HSC Code, the following descriptive note is to be entered into the Certificate of class:

"High-speed passenger Category A craft"

For a passenger ship defined as “Category B craft” in respect to the HSC Code, the following descriptive note is to be entered into the Certificate of class:

"High-speed passenger Category B craft"

For a ship other than above, the type of service may be specified as a descriptive note, and may be entered into the Certificate of class (e.g. "High-speed cargo ship").

**4.2.5.12** Tugs

**Tug (Teglač)** - a ship specially constructed and equipped for towing and/or rescuing and salvage of ships or other floating units.

**4.2.5.13** Supply vessels

**Supply vessel (Brod za opskebu)** - a ship mainly intended and equipped for the carriage of special personnel, special materials and equipment which are used to provide facilities to offshore units and other marine installations, as well as to provide assistance in performing special activities.

For ships complying with IMO MSC/Circ.645 "Guidelines for vessels with dynamic positioning system", the following descriptive note is to be entered into the Certificate of class:

"Ship equipped with Dynamic positioning system (DPS)"

**4.2.5.14** Technical floating units

Technical floating unit is a general term comprising following types of self-propelled or non-self-propelled ships intended for performance of technical activities.

**Dredger (Jaružalo)** - a ship provided with fixed arrangements and equipment for dredging the sea floor, rivers, lakes, canals or harbours, whether or not equipped with spaces for receiving dredged material.

**Floating crane (Ploveča dizalica)** - a ship with pontoon hull and a lifting crane, specifically arranged and equipped for lifting of heavy cargoes. If the weather deck is specially strengthened this may be intended for carrying heavy cargoes.

**Self-unloading hopper barge (Samoiskrčevalna klapeča)** - a technical floating unit (usually non-self-propelled) arranged in such a way that the dredged material may be unloaded through special devices fitted on the bottom.

**Split hopper barge (Klapeča s uredajem za rastvaranje dna)** - a technical floating unit (usually non-self-propelled) arranged such that the dredged material may be unloaded by splitting the hull into two halves.

**Dump barge (Prevratljaka)** - a technical floating unit (usually non-self-propelled) arranged such that the dredged material may be unloaded inclining the hull.

**Barge-solid bulk in cargo holds (Teglenica-teret v skladiščima)** - a technical floating unit (usually non-self-propelled) intended for carriage of solid bulk cargo in cargo holds.

**Barge-cargo on weather deck (Teglenica-teret na palubi)** - a technical floating unit (usually non-self-propelled) intended for carriage of cargo on weather deck.

**Barge-liquid bulk cargo in cargo tanks (Teglenica-tekući teret v tankovina)** - a technical floating unit (usually non-self-propelled) intended for carriage of liquid bulk cargo in cargo tanks.

**Technical floating unit (Tehnički plovni objekt)** - a technical floating unit (self or non-self-propelled) designed and equipped for specific purposes, found to comply with the relevant requirements of the Rules and not comprised within any of above, generally having specific features described by descriptive note(s).

**4.2.5.15** Ships for lifting and handling of heavy cargoes

**Crane ship (Brod dizalica)** - a ship specially designed and equipped with a lifting crane for lifting and carriage of heavy cargoes.
4.2.5.16 Livestock carriers

Livestock carrier (Brod za stoku) - a ship designed for carriage of livestock in holds and platforms above the main deck divided in special compartments.

4.2.5.17 Research ships

Research ship (Istraživački brod) - a ship without cargo spaces, engaged in scientific research, non-commercial expeditions and surveys, carrying scientists, technicians and members of expeditions, and provided with special equipment and arrangements suitable for that purpose (i.e. laboratories, accommodation for research personnel, etc.).

NOTE: Every research ship, having GT ≥ 500, applied for classification and for which Special Purpose Ship Safety Certificate has been issued on or after 13 May 2008, should comply with the provisions of IMO Res. MSC.266(84) also.

4.2.5.18 Training ships

Training ship (Školski brod) - a ship for training of marine personnel gaining training and practical marine experience to develop seafaring skills suitable for a professional career at sea, and provided with special equipment and arrangements suitable for that purpose (teaching rooms, accommodation spaces for teachers and trainees, etc.).

NOTE: Every training ship, having GT ≥ 500, applied for classification and for which Special Purpose Ship Safety Certificate has been issued on or after 13 May 2008, should comply with the provisions of IMO Res. MSC.266(84) also.

4.2.5.19 Fishing vessels

Fishing vessel (Ribarski brod) - a self-propelled ship intended and equipped for fishing or exploiting other living resources of the sea.

4.2.5.20 Floating units

Floating units are units generally engaged in port areas or other enclosed areas, permanently moored, anchored, or based on the sea bed, or wholly or partially buried below the sea floor and generally not intended for navigation. This term comprises:

Floating dock (Plutajući dok) - a non-self-propelled floating unit, specifically designed, permanently moored and anchored, equipped for lifting and/or launching ships, floating units and non-self-propelled crafts, while drydocking, repairs or modifications are performed.

Floating storage (Plutajuće skladište) - a floating unit specifically designed and equipped, permanently moored and anchored, intended for storage of cargoes in liquid (including FPSOs), or packed form or in bulk.

Floating restaurant (Plutajući restoran) - a unit specifically designed and equipped, permanently moored and anchored intended for catering.

4.2.5.21 Ships used by Authorities

Ship used by Authorities (Javni brod) - a ship owned by the State or its body, not being a war ship or a vessel engaged in trade, and includes the following types: pilot boats, rescue vessels, police boats, custom boats, etc.

4.2.5.22 Yachts

Yacht (Jahta) - recreational craft for personal or commercial use, having hull length greater than 12 meters, having facilities and accommodation for extended navigation, authorized to carry not more than 12 passengers, excluding crew.

4.2.6 Additional character of class is denoting ship’s constructional characteristics. If applicable, one or several of the following characters are to be assigned:

CAR - CARRIAGE OF CARS. This character is to be assigned to a ship specially equipped for carriage of cars but not specifically designed for this purpose.

CON - CARRIAGE OF CONTAINERS. This character is to be assigned to a ship equipped for carriage of containers not specifically designed for this purpose.

CREST - CROATIAN REGISTER OF SHIPPING EVALUATION OF STRUCTURE. This character is to be assigned to a ship the structural condition of which is checked with 3D FEM calculation programme at design stage or after construction, according to the requirements of the Register. Detailed technical requirements and conditions for assignment of this character of class are contained in the CREST Guidelines of the Register.

ESP - ENHANCED SURVEY PROGRAMME. This character is to be assigned to a ship with hull subjected to enhanced survey program (applicable to the following types of ships: bulk carrier, self-unloading bulk carrier, ore carrier, ore/oil carrier, OBO carrier, tanker for oil, chemical tanker and product carrier with GT ≥ 500). See 4.3

EXP - EXPERIMENTAL HULL OR HULL EQUIPMENT. This character is to be assigned to the ship with the hull or hull equipment constructed in accordance with design, for which sufficient experience is not available. The Register will decide at what intervals the required surveys will have to be carried out. If the experience over prolonged period of time has proved the efficiency of design the character EXP may be cancelled.

FIR - FIRE FIGHTING EQUIPMENT. This character is to be assigned to a ship equipped with appropriate firefighting equipment, which is to be approved by the Register, intended for firefighting operations on other vessels and harbour facilities. For specific requirements related to this character refer to the Rules, Part 17 - Fire protection, 2.9.

GRC - GRAIN CARRIAGE. This character is to be assigned to a ship which complies with the requirements of IMO Res. MSC.23(59) (International Code for the Safe Carriage of Grain in Bulk).

HCS - HEAVY CARGO STRENGTHENED. This character is to be assigned to a ship when all, or some cargo holds are strengthened for carriage of heavy cargoes. For additional requirements
related to this character refer to the Rules, Part 2 - Hull.

HME - **HOLDS MAY BE EMPTY.** This character is to be assigned to a ship when some of the cargo holds may be empty when carrying cargo (example shows the way of indication when holds 1, 3 and 5, or 2 and 4 may be empty: HME 1,3,5/2,4).

IWS - **IN-WATER SURVEY.** This character is to be assigned to a ship with a hull specially marked and equipped for in-water surveys.

PW-CA - **PROTECTION AT WORK AND CREW ACCOMMODATION.** This character is to be assigned to a ship complying with the requirements for the protection at work and crew accommodation as stipulated in the Rules for technical supervision of sea-going ships, Part 20 - Protection at work and crew accommodation.

S - **INTACT STABILITY.** This character is to be assigned to a ship when intact stability file has been examined by the Register.

SD - **DAMAGE STABILITY.** This character is to be assigned to a ship when damage buoyancy and stability file has been examined by the Register.

TOD - **TIMBER ON DECK.** This character is to be assigned to a ship specially equipped for carriage of timber on deck and complying with IMO Res. A.1048(27) (Code of Safe Practice for ships Carrying Timber Deck Cargoes, 2011 (2011 TDC Code)).

### 4.3 MANDATORY SHIP TYPE AND ENHANCED SURVEY PROGRAMME (ESP) NOTATIONS

#### 4.3.1 Preamble

The regime of enhanced surveys given in the following IACS Unified Requirements (UR) (see the Rules, Part 1 – General requirements, Chapter 5 - Surveys of ships in service, also):

- .1 UR Z10.1 - Hull surveys of oil tankers which are not double hull oil tankers;
- .2 UR Z10.2 - Hull surveys of single side skin bulk carriers 1);
- .3 UR Z10.3 - Hull surveys for chemical tankers;
- .4 UR Z10.4 - Hull surveys for double hull oil tankers;
- .5 UR 10.5 - Hull surveys for double side skin bulk carriers 3);
- .6 UR Z10.2 and/or Z10.5 - Hull surveys for ore carriers, depending on the structural configuration;
- .7 UR Z10.2 and/or Z10.5 and Z10.1 and/or Z10.4 Hull surveys for combination carriers (ore/oil and oil/bulk/ore), depending on the structural configuration; as appropriate, are applicable to a number of ship types falling within the broad definitions of oil tankers, chemical tankers and bulk carriers contained in above listed URs.

4.3.1.2 To clearly indicate to shipowners and the users of the Register Book of the Register those ships which are subject to an enhanced survey programme, the following notations shall be included within the class notation assigned to all such ships, built and/or maintained in accordance with the Rules.

#### 4.3.2 Ship type and enhanced survey programme (ESP) notations

##### 4.3.2.1 Oil Tanker

4.3.2.1.1 The ship type notation **Tanker for oil**, or equivalent, and the notation **ESP** shall be assigned to sea going self-propelled ships 2) which are constructed generally with integral tanks and intended primarily to carry oil in bulk. This type notation shall be assigned to tankers of both single and double hull construction, as well as tankers with alternative structural arrangements, e.g. mid-deck designs. Typical midship sections are given in Figure 4.3-1 a).

**NOTE:** Oil tankers that do not comply with MARPOL, Reg. I/19 may be subject to International and/or National Regulations requiring phase out under MARPOL, Reg. I/20 and/or MARPOL, Reg. I/21.

##### 4.3.2.2 Bulk Carrier

4.3.2.2.1 The ship type notation **Bulk carrier**, or equivalent, and the notation **ESP** shall be assigned to sea going self-propelled ships 2) which are constructed generally with single deck, double bottom, hopper side tanks and topside tanks and with single or double skin construction in cargo length area and intended primarily to carry dry cargoes in bulk. Typical midship sections are given in Figure 4.3-1 b).

##### 4.3.2.3 Ore Carrier

4.3.2.3.1 The ship type notation **Ore carrier**, or equivalent, and the notation **ESP** shall be assigned to sea going self-propelled ships 2) which are constructed generally with single deck, double bottom, hopper side tanks and topside tanks and with single or double skin construction in cargo length area and intended to carry and self-unload dry cargoes in bulk. Typical midship sections are given in Figure 4.3-1 g).

1) 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 UR Z10.2 are to apply to cargo holds of single side skin and Z10.5 to cargo holds of double side skin.

2) Self-propelled ships are ships with mechanical means of propulsion not requiring assistance from another ship during normal operation.
deck, two longitudinal bulkheads and a double bottom throughout the cargo length area and intended primarily to carry ore cargoes in the centre holds only. Typical midship sections are given in Figure 4.3-1 c).

4.3.2.4 Combination Carrier

4.3.2.4.1 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 oily mixture retained in slop tanks. The ship types defined in 4.3.2.4.2 and 4.3.2.4.3 below shall be considered to be combination carriers.

4.3.2.4.2 The ship type notation Ore/oil carrier, or equivalent, and the notation ESP shall be assigned to sea going self-propelled ships 2) 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 4.3-1 d).

NOTE: Ore / oil carriers that do not comply with MARPOL, Reg. I/19 may be subject to International and/or National Regulations requiring phase out.

4.3.2.4.3 The ship type notation (Oil / Bulk / Ore) OBO carrier, or equivalent, and the notation ESP shall be assigned to sea going self-propelled ships 3) which are constructed generally with single deck, double bottom, hopper side tanks and topside tanks, and with single or double side skin construction in the cargo length area, and intended primarily to carry oil or dry cargoes, including ore, in bulk. Typical midship sections are given in Figure 4.3-1 e).

NOTE: Oil / Ore / Bulk carriers that do not comply with MARPOL, Reg. I/19 may be subject to International and/or National Regulations requiring phase out.

4.3.2.5 Chemical tanker

4.3.2.5.1 The ship type notation Chemical tanker, or equivalent, and the notation ESP shall be assigned to sea going self-propelled ships 3) 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 hull construction, as well as tankers with alternative structural arrangements. Typical midship sections are given in Figure 4.3-1 f).

IACS UR Z11
Table 4.2.2-1
Characters denoting quality of hull and relating class term

<table>
<thead>
<tr>
<th>Building material of hull</th>
<th>Character denoting quality of hull</th>
<th>Class term (years)</th>
<th>Character denoting navigation area</th>
<th>Exemptions related to ship’s equipment and navigation area (applicable to all ships excluding fishing vessels)</th>
</tr>
</thead>
<tbody>
<tr>
<td>METALLIC MATERIALS</td>
<td>100A1</td>
<td>5</td>
<td>1 or 2</td>
<td>No exemptions</td>
</tr>
<tr>
<td></td>
<td>100A2</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>90A1</td>
<td>5</td>
<td>3 or 4</td>
<td>Mooring and anchoring equipment is to be defined according to equipment number as defined in the Rules, Part 3 – Hull Equipment</td>
</tr>
<tr>
<td></td>
<td>90A2</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50A1</td>
<td>5</td>
<td>5, 6, 7 or 8</td>
<td>Anchoring equipment for navigation area notations 5, 6, 7 and 8 is to be defined according to equipment number as defined in the Rules, Part 3 – Hull Equipment</td>
</tr>
<tr>
<td></td>
<td>50A2</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NON-METALLIC MATERIALS</td>
<td>90B1</td>
<td>5</td>
<td>1 or 2</td>
<td>Mooring and anchoring equipment is to be defined according to equipment number as defined in the Rules, Part 3 – Hull Equipment</td>
</tr>
<tr>
<td></td>
<td>90B2</td>
<td>5</td>
<td>1, 2, 3, 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50B1</td>
<td>5</td>
<td>5, 6, 7 or 8</td>
<td>Anchoring equipment for navigation area notations 5, 6, 7 and 8 is to be defined according to equipment number as defined in the Rules, Part 3 – Hull Equipment</td>
</tr>
<tr>
<td></td>
<td>50B2</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) In some exceptional cases, for ships having 90B1 character of class assigned, navigating area 1 or 2 may be affixed, considering each case separately.

In some exceptional cases, for ships having 90B1 character of class assigned, navigating area 1 or 2 may be affixed, considering each case separately.
Figure 4.3-1
Typical transverse sections for ships with ESP notation affixed

<table>
<thead>
<tr>
<th></th>
<th>a) Oil tankers</th>
<th>b) Bulk carriers</th>
<th>c) Ore carriers</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Oil tankers" /></td>
<td><img src="image2" alt="Bulk carriers" /></td>
<td><img src="image3" alt="Ore carriers" /></td>
<td></td>
</tr>
</tbody>
</table>
d) Ore / oil carriers

e) Oil/bulk/ore (OBO) carriers

f) Chemical tankers
4.4 MACHINERY INSTALLATION

4.4.1 Main character of class for machinery installation denoting survey during construction and when after construction is maintained in a condition considered satisfactory by the Register. One of the following characters:

- is assigned to a ship if:
  a) the machinery installation has been built under survey and to the satisfaction of the Register in accordance with the Rules, or
  b) the machinery installation has been built in accordance with the Rules, but under survey and to the satisfaction of another recognized classification society.

- the machinery installation has been built under survey, in compliance with the rules and to the satisfaction of another recognized classification society.

- the machinery installation has been built without survey of the Register or any other recognized classification society.

4.4.2 Main character of class denoting quality of machinery installation. Class term for this character of class is 5 years. One of the following is to be assigned:

M1 - this character of class is to be assigned to a ship if main propelling and essential auxiliary engines are fully complying with requirements of the Rules.

M2 - this character of class is to be assigned to a ship if main propelling and essential auxiliary engines are not fully complying with requirements of the Rules.

M2 - this character of class may be assigned on the case-by-case basis subject to special consideration of the Register. In that case assigning of the subject class notation is utilised by accepting the manufacturer’s certificates for items of propelling and essential machinery (including gearing with single input/output arrangements) and for electrical power generators, subject to the following requirements:

1. Propulsion engines are to be type approved by the Register (or by some other recognized classification society 3).

2. Generators for electrical power are to be type approved by the Register (or by some other recognized classification society 3).

3. Machinery and associated systems are designed and manufactured according to the requirements of the Rules.

4. Machinery and equipment is manufactured under the recognized quality system.

5. Propellers, propeller shafts and multiple input/output gearboxes are excluded from above stated, i.e. will not be found acceptable if supplied with the manufacturer's certificate.

Notwithstanding above stated, assignment of M2 is excluded for the following cases:

- ships intended for navigation in navigation area 1 or navigation area 2;
- ships having more than 300 GT;
- passenger ships;
- ships falling under the scope of HSC Code;
- fishing vessels having length more than 24 meters and falling under the scope of EU Directive 97/70/EC, as amended.

In exceptional cases, assignment of subject character of class may be applied even if the procedure for the assignment differs from above, but however deemed acceptable by the Register.

3) In this case term "recognised classification society" comprises EU RO.
this character of class may be assigned to existing ship at the occasion of initial class entry in cases other than above and in the following cases:

1. when the propelling and essential auxiliary machinery engines have not been manufactured under the supervision of the Register;
2. when the propelling and essential auxiliary machinery engines have not been manufactured under the supervision of the recognized classification society;

under presumption that during the survey a thorough examination of existing machinery installation has been carried out with satisfactory results.

EXP - this character of class is to be assigned to a ship whose machinery installation is constructed in accordance with design, for which sufficient experience is not available. The Register will decide at what intervals the required surveys will have to be carried out. If the experience over prolonged period of time has proved the efficiency of design the character EXP may be cancelled.

4.4.3 Additional character of class denoting automation level. If applicable, one of the following is to be assigned:

AUT 1 - this character of class is to be assigned to a ship having automation level requiring unattended machinery spaces and control room.

AUT 2 - this character of class is to be assigned to a ship having automation level requiring unattended machinery spaces but requiring attended control room.

AUT 3 - this character of class is to be assigned to a ship having total machinery power output not exceeding 1500 [kW] and automation level requiring unattended machinery spaces. Notwithstanding above stated in the case of ships which are not intended for unrestricted navigation this class notation may be assigned even if total machinery power output exceeds 1500 [kW].

4.4.4 Additional characters of class IGS and COW. If applicable, one of the following is to be assigned:

IGS - this character of class is to be assigned to a ship equipped with inert gas system. Oil tankers (Tanker for oil or Product carrier) having 20,000 tons deadweight and above intended for the carriage of liquid cargo with flash point below 60 °C (closed cup test) and all ships with crude oil washing arrangement regardless of their size shall be fitted with permanently installed inert gas system.

COW - this character of class is to be assigned to a ship equipped with crude oil washing system. Ships carrying crude oil having 20,000 tons deadweight and above are to be fitted with cargo tank cleaning system using crude oil washing arrangement complying with MARPOL 73/78, Annex I, Reg. 33 and Reg. 35, which refers to "Revised Specifications for the Design, Operation and Control of Crude Oil Washing Systems", adopted by IMO Res. A.446(XI), as amended by A.497(XII) and as further amended by A.897(21). Additional requirements related to the assignment of this character of class are as follows:

1. General

1. The crude oil washing system shall fully comply with the requirements of IMO Resolution A.446(XI), as amended by IMO Resolution A.497(XII) and as further amended by IMO Resolution A.897(21) within one year after the tanker was first engaged in the trade of carrying crude oil or by the end of the third voyage carrying crude oil suitable for crude oil washing, whichever occurs later (see 5.2).

2. Every oil tanker operating with crude oil washing system shall be provided with an Operations and Equipment Manual detailing the system and equipment and specifying operational procedures, to the satisfaction of the Register.

3. Every oil tanker fitted with a cargo tank cleaning system using crude oil washing shall be provided with an inert gas system, according to the Rules, Part 17 - Fire protection.

2. Piping

1. The crude oil washing pipes and all valves incorporated in the supply piping system shall be of steel or other equivalent material and shall be of adequate strength having regard to the pressure to which they may be subjected, and shall be properly jointed and supported. Piping is to comply with the requirements of the Rules, Part 8 - Piping.

2. The crude oil washing system shall consist of permanent piping and shall be independent of the fire mains and of any system other than for tank washing. Sections of the ship's cargo system may be incorporated in the crude oil washing system provided that they meet the requirements applicable to crude oil piping.

3. Notwithstanding the requirements of 2.2, in combination carriers the arrangement of crude oil washing system may allow:

1. The removal of the equipment, if necessary, when carrying cargoes other than crude oil, provided that, when reinstated, the system is as originally fitted and tested for oil tightness;
.2 The use of flexible hose pipes to connect the crude oil washing system to tank washing machines if it is necessary to locate these machines in a cargo tank hatch cover. Such flexible hose pipes must be provided with flanged connections and be manufactured and tested in accordance with the Rules, Part 8 - Piping. The length of these hoses shall be no greater than necessary to connect the tank washing machines to an adjacent point just outside the hatch coaming. These hoses shall be removed to suitably prepared and protected stowage when not in use and be pressure tested by an authority acceptable to the Register at intervals of not more than two and a half years.

.4 Provision shall be made to prevent over-pressure in the tank washing supply piping. Any relief device fitted to prevent overpressure shall discharge into the suction side of the supply pump. Alternative methods to the satisfaction of the Register may be accepted provided an equivalent degree of safety and environmental protection is provided. One such alternative is that where the system is served only by centrifugal pumps so designed that the pressure derived cannot exceed that for which the piping is designed, a temperature sensing device located in the pump casing is required to stop the pump in the case of overheating.

.5 Where hydrant valves are fitted for water washing purposes on tank washing lines, all such valves shall comply with 2.1 and provision shall be made for such connections to be blanked off by blank flanges when washing lines may contain crude oil. Alternatively, hydrant valves shall be isolated from the crude oil washing system by spade blanks.

.6 All connections for pressure gauges or other instrumentation shall be provided with isolating valves adjacent to the lines unless the fitting is of the sealed type.

.7 No part of the crude oil washing system shall enter the machinery spaces. Where the tank washing system is fitted with a steam heater for use when water washing, the heater must be effectively isolated during crude oil washing by double shut-off valves or by clearly identifiable blanks. The steam heater referred to shall be located outside the machinery spaces.

.8 Where a combined crude oil-water washing supply piping is provided the piping shall be so designed that it can be drained so far as is practicable of crude oil, before water washing is commenced, into spaces designated in the Operations and Equipment Manual. These spaces may be the slop tank or other cargo spaces.

.9 The piping system shall be of such diameter that the greatest number of tank cleaning machines required, as specified in 2.8, can be operated simultaneously at the designed pressure and throughput. The arrangement of the piping shall be such that the required number of tank cleaning machines to each cargo compartment, can be operated simultaneously.

.10 The piping system shall be tested to 1.5 times the working pressure after it has been installed on the ship.

.11 The crude oil washing supply piping shall be anchored (firmly attached) to the ship's structure at appropriate locations, and means shall be provided to permit freedom of movement elsewhere to accommodate thermal expansion and flexing of the ship. The anchoring shall be such that any hydraulic shock can be absorbed without undue movement of the supply piping. The anchors should normally be situated at the ends furthest from the entry of the crude oil supply to the supply piping. If tank washing machines are used to anchor the ends of branch pipes then special arrangements are necessary to anchor these sections when the machines are removed for any reason.

3. Tank washing machines

.1 The tank washing machines for crude oil washing shall be permanently mounted and shall be of a design acceptable to the Register.

.2 The performance characteristic of a tank washing machine is governed by nozzle diameter, working pressure and the movement pattern and timing. Each tank cleaning machine fitted shall have a characteristic such that the sections of the cargo tank covered by that machine will be effectively cleaned within the time specified in the Operations and Equipment Manual.

.3 Tank washing machines shall be mounted in each cargo tank and the method of support shall be to the satisfaction of the Register. Where the tank washing machines are positioned well below the deck level to cater for protuberances in the tank, consideration may need to be given to additional support for the machines and their supply piping.
Each machine shall be capable of being isolated by means of stop valves in the supply line. If a deck mounted tank washing machine is removed for any reason, provision shall be made to blank off the oil supply line to the machine for the period the machine is removed. Similarly, provision shall be made to close the tank opening with a plate or equivalent means.

Where more than one submerged machine is connected to the same supply line a single isolating stop valve in the supply line may be acceptable provided the rotation of the submerged machines can be verified in accordance with 3.11.1 or 3.11.3.

The drive units for the tank cleaning machines are to be an integral with the tank cleaning machine.

The number and location of the tank washing machines shall be to the satisfaction of the Register.

The location of the machines is dependent upon the characteristics detailed in 3.2 and upon the configuration of the internal structure of the tank.

The number and location of the machines in each cargo tank and oily mixture (slop) tank shall be such that all horizontal and vertical areas are washed by direct impingement or effectively by deflection or splashing of the impinging jet. In assessing an acceptable degree of jet deflection and splashing, particular attention shall be paid to the washing of upward facing horizontal areas and the following parameters shall be used:

1. For horizontal areas of a tank bottom and the upper surfaces of a tank's stringers and other large primary structural members, the total area shielded from direct impingement by deck or bottom transverses, main girders, stringers or similar large primary structural members shall not exceed 10% of the total horizontal area of tank bottom, the upper surface of stringers, and other large primary structural members.

2. For vertical areas of the sides of a tank, the total area of the tank's sides shielded from direct impingement by deck or bottom transverses, main girders, stringers or similar large primary structural members shall not exceed 15% of the total area of the tank's sides.

In some installations it may be necessary to consider the fitting of more than one type of tank washing machine in order to effect adequate coverage.

At the design stage the following minimum procedures shall be used to determine the area of the tank surface covered by direct impingement:

1. Using suitable structural plans, lines are set out from the tips of each machine to those parts of the tank within the range of the jets.

2. Where the configuration of the tanks is considered by the Register to be complicated, a pinpoint of light simulating the tip of the tank washing machine in a scale model of the tank shall be used.

3. Shadow diagrams must be on drawings the scale of which must be at least:

1. 1:100 for tankers of less than 100,000 tons deadweight,
2. 1:200 for tankers of 100,000 tons deadweight and above.

4. The drawings must provide at least a plan view, a profile view and an end elevation for each tank, or for tanks considered to be similar.

5. Sufficient detailed drawings of the vessel must be provided to check that all large primary structural members have been included.

6. Guidelines for the assessment of shadow diagrams are given in 4.2.9 of Appendix III to IMO Resolution A.446(XI), as amended.

The design of the deck mounted tank washing machines shall be such that means are provided, external to the cargo tanks, when crude oil washing is in progress, would indicate the rotation and arc of the movement of the machine. Where the deck mounted machine is of the non-programmable, dual nozzle type, alternative methods to the satisfaction of the Register may be accepted provided an equivalent degree of verification is attained.

Where submerged machines are required, they should be non-programmable and, in order to comply with the requirements of 3.8, it must be possible to verify their rotation by one of the following methods:

1. By indicators external to the tank;
2. By checking the characteristic sound pattern of the machine, in which case the operation of the machine shall be verified towards the end of each wash cycle.

Where two or more submerged machines are installed on the same supply line, valves shall be provided...
and arranged so that operation of each machine can be verified independently of the other machines on the same supply line;

.3 By gas freeing the tank and checking the operation of the machine with water during ballast voyages.

The method of verification shall be stated in the Operations and Equipment Manual.

.12 Fixed washing machines shall comply with the following:

.1 Stresses in piping or deck supports which arise during washing operation or when immersed into liquid shall not exceed allowable stresses.

.2 Machines shall be made of steel or other material which does not initiate sparking due to friction more than steel.

.3 Machines shall be earthed through hull.

4. Pumps for crude oil washing system

.1 The pumps supplying crude oil to the tank cleaning machines shall be either the cargo pumps or pumps specifically provided for the purpose.

.2 The capacity of the pumps shall be sufficient to provide the necessary throughput at the required pressure for the maximum number of tank cleaning machines required to be operated simultaneously as specified in the Operations and Equipment Manual. In addition to the above requirement, the pumps shall, if an eductor system is fitted for tank stripping, be capable of supplying the eductor driving fluid to meet the requirements of 5.2.

.3 The capacity of the pumps shall be such that the requirements of 4.2 can be met with any one pump inoperative. The pumping and piping arrangements shall be such that the crude oil washing system can be effectively operated with any one pump out of use.

.4 The carriage of more than one grade of cargo shall not prevent crude oil washing of tanks.

.5 To permit crude oil washing to be effectively carried out where the back pressure presented by the shore terminal is below the pressure required for crude oil washing, provision shall be made that such an adequate pressure to the washing machines can be maintained in accordance with 4.2. This requirement shall be met with any one cargo pump out of action. The minimum supply pressure required for crude oil washing shall be specified in the Operations and Equipment Manual. Should this minimum supply pressure not be obtainable, crude oil washing operations shall not be carried out.

.6 Pumps shall be in accordance with the Rules, Part 8 - Piping and Part 9 - Machines.

5. Stripping system

.1 The design of the system for stripping crude oil from the bottom of every cargo tank shall be to the satisfaction of the Register.

.2 The design and capacity of the tank stripping system shall be such that the bottom of the tank being cleaned is kept free of accumulations of oil and sediment towards completion of the tank washing process.

.3 The stripping system shall be capable of removing oil at a rate of 1.25 times the total throughput of all the tank cleaning machines to be operated simultaneously when washing the bottom of the cargo tanks or during any stage of the bottom washing as specified in the Operations and Equipment Manual.

.4 Means such as level gauges, hand dipping and stripping system performance gauges as referred to in 5.9 shall be provided for checking that the bottom of every cargo tank is dry after crude oil washing. Suitable arrangements for hand dipping must be provided at the aftermost portion of a cargo tank and in three other suitable locations unless other approved means are fitted for efficiently ascertaining that the bottom of every cargo tank is dry. The cargo tank bottom shall be considered dry if there is no more than a small quantity of oil near the stripping suction with no accumulation of oil elsewhere in the tank. Level indicators system shall be of closed type (water-gas tight).

.5 Every oil tanker required to be provided with segregated ballast tanks or fitted with a crude oil washing system, shall comply with the following requirements:

.1 Oil piping is to be so designed and installed that oil retention in the lines is minimised.

.2 Means shall be provided to drain all cargo pumps and all oil lines at the completion of cargo discharge, where necessary, by connection to a stripping device. The line and pump draining shall be capable of being discharged both to a cargo tank or a slop tank and ashore. For discharge ashore a special small diameter line shall be provided and shall be con-
connected outboard of the ship’s manifold valves. The cross-sectional area of this line shall not exceed 10 % of that of a main cargo discharge line.

.6 In crude oil tankers having individual cargo pumps in each tank, each pump having an individual piping system, dispensation from the required special small diameter line may be given in cases where the combined amount of oil left in the tank after stripping and the volume of oil in the piping system from the manifold to the tank is less than 0.00085 times the volume of the cargo tank. If a deep well cargo pump system is provided with an evacuating system for retained oil, the above consideration should also apply.

.7 The means for stripping oil from the cargo tanks shall be by positive displacement pump, self-priming centrifugal pump or eductor or other methods to the satisfaction of the Register. Where a stripping line is connected to a number of tanks, means shall be provided for isolating each tank not being stripped at that particular time.

.8 The internal structure of the tank shall be such that drainage of oil to the tank suction of the stripping system is adequate to meet the requirements of 5.2 and 5.4. Care shall be taken that both longitudinal and transverse drainage are satisfactory and shall be verified during the inspection.

.9 Equipment shall be provided for monitoring the efficiency of the stripping system. All such equipment shall have remote read-out facilities in the cargo control room or in some other safe and convenient place easily accessible to the officer in charge of cargo and crude oil washing operations. Where a stripping pump is provided, the monitoring equipment shall include, as appropriate, a flow indicator, or a stroke counter or a revolution counter, and pressure gauges at the inlet and discharge connections of the pump or equivalent. Where eductors are provided, the monitoring equipment shall include pressure gauges at the driving fluid intake and at the discharge and a pressure/vacuum gauge at the suction intake.

.10 The trim conditions for crude oil washing given in the Operations and Equipment Manual shall be adhered to.

4.4.5 Additional character of class PMON (Propeller Shaft Condition Monitoring) is to be assigned to a vessel fitted with propeller shaft specifically arranged either with oil or with water lubricated stern tube bearings, allowing the vessel to be granted with a reduced scope for complete propeller shaft surveys.

The requirements for the assignment of this character of class are given in the Rules, Part 7 - Machinery installation.

The requirements for the maintenance of this character of class are given in the Rules, Part 1 – General requirements, Chapter 3 - Surveys of ships in service.

4.5 REFRIGERATING PLANT

4.5.1 Main character of class for refrigerating plant denoting survey during construction and when after construction is maintained in a condition considered satisfactory by the Register. One of the following characters:

⭐️R - is assigned to a ship if:
  a) the refrigerating plant has been built under survey and to the satisfaction of the Register in accordance with the Rules, or
  b) the refrigerating plant has been built in accordance with the Rules, but under survey and to the satisfaction of another recognized classification society.

⭐️R - the refrigerating plant has been built under survey, in compliance with the rules and to the satisfaction of another recognized classification society.

[No symbol] - the refrigerating plant has been built without survey of the Register or any other recognized classification society.

4.5.2 Additional characters of class denoting ability of refrigerating plant. If applicable, one or both characters are to be assigned:

+ - this character of class is assigned to a ship having the refrigerating plant with a cooling capacity sufficient to reduce on board the temperature of non-pre-cooled cargo during a period of time, providing preservation of the cargo.

C - this character of class is assigned to a ship having the refrigerating plant with a cooling capacity sufficient to deliver pre-cooled air of the required temperature to refrigerated cargo containers during a period of time, providing preservation of the cargo.

4.5.3 For refrigerating plant a 5 year class term is required.
5 CLASSIFICATION PROCEDURE

5.1 REQUEST FOR CLASSIFICATION

5.1.1 A request for issuing the Certificate of class, i.e. a "Request for the classification" is to be submitted to the Register by the Owner (or by the Company) in writing.

5.1.2 Assigning class to ships having GT < 100 is subject to special consideration of the Register.

5.1.3 Either the Owner (or the Company), or the Register can terminate as of right the requested service after giving the other party thirty days' written notice, for convenience, and without prejudice to the provisions in 5.6.2.3.

5.1.4 The class granted to the concerned ship and previously issued certificates remains valid until the date of effect of the notice issued according to 5.1.3 subject to compliance with 5.3.3 and 5.6.2.3.

5.2 ISSUING OF THE CERTIFICATE OF CLASS

5.2.1 After completion of the survey during construction, and when the attending Surveyor is of the opinion that all the requirements for the class assignment have been met, the Interim certificate of class shall be issued.

Interim certificate of class has 5 (five) months validity, i.e. until ship's class is verified by the Head Office of the Register through issuing the full term Certificate of class.

5.2.2 Survey during construction may be considered to be completed with some minor items unverified, provided that such items are stated as the conditions of class, including related time limits for their rectification. At the same time the attending Surveyor will document the completion of the survey during construction by issuing the Interim certificate of class and sending conditions of class to the Head Office of the Register.

5.2.3 In case of admission to class of an existing ship which has not been built under survey of the Register, or in the case of re-classification of an existing ship, the Interim certificate of class will be issued after the satisfactory completion of the Initial class entry survey, and when the attending Surveyor is of the opinion that all the requirements for the class assignment, or transfer of class have been met.

5.2.4 The class will be assigned to a ship and a full term validity Certificate of class will be issued to a ship after examination of the Surveyor's reports and records, and verification that the requirements of the Rules corresponding to the class have been met.

5.2.5 The Head Office may not issue the Certificate of class if it is presumed that all requirements of the Rules have not been fulfilled, even if the Interim certificate of class has been previously issued.

5.2.6 All new ships (ships contracted for construction on or after 1 July 2014) with a length of 24 meters and above will be assigned class only after it has been demonstrated that their intact stability is adequate for the intended service.

Adequate intact stability means compliance with standards laid down by the relevant Flag State Administration or those of the Register taking into account the ship's size and type. The level of intact stability for ships with length of 24 meters and above in any case should not be less than that provided by Part A of IMO Res. MSC.267(85) as applicable to the type of ship being considered.

Where other criteria are accepted by the Flag State Administration concerned, these criteria may be used for the purpose of classification.

Evidence of approval by the Flag State Administration concerned may be accepted for the purpose of classification.

5.2.7 The Register reserves the right to add special description notes on the Certificate of class, as well as any other information or restrictions having influence on the ship operation relevant for the classification.

5.3 MAINTAINING THE VALIDITY OF CERTIFICATE OF CLASS

5.3.1 It is the responsibility of the Owner (or the Company) to ensure that all surveys necessary for the maintenance of class are carried out at proper time in accordance with the Rules.

5.3.2 Validity of the Certificate of class is determined with class term with a condition of surveys (Annual, Intermediate, Renewal, Docking, etc.) to be carried out in specified intervals as prescribed in the Rules, Part 1 - General requirements, Chapter 5 - Surveys of ships in service, and to be completed to the satisfaction of the Register.

After completion of Initial or Renewal survey to the satisfaction of the Register, the Register will issue the Certificate of class.

After completion of Annual and Intermediate surveys, to the satisfaction of the Register, the Register will endorse the Certificate of class.

5.3.3 The ship, machinery installations and related essential arrangements and systems are to be adequately manned and competently handled and maintained at a standard complying with the requirements of the Rules.

The ship is to be loaded and operated taking into respect distribution of cargo and ballast, if necessary to the securing of cargo, as well as to the operation of ship in heavy weather, including any limitation or restriction imposed by the Register.

5.3.4 Any damage or excessive wastage of the ship's structure (i.e. shell frames and their end attachments, shell plating, deck structure, deck plating, bottom structure, bottom plating, watertight bulkheads, oiltight bulkheads, hatch coamings and hatch covers) beyond allowable limits affecting ship's class are to be immediately and permanently repaired after the survey.
For locations where adequate repair facilities are not available, consideration may be given to allow the ship to proceed directly to repair yard. For such intended voyage discharging of the cargo and/or immediate temporary repairs may be required.

If concluded by the Register that such damage or wastage is not immediately affecting ship’s class, it’s safety and integrity, safety of the crew, passengers, or sea environment, the ship may be allowed to be temporarily repaired for a period to be defined, which as a result may have issuing of a new Certificate of class with a reduced period of validity, and/or imposing of appropriate conditions of class.

5.3.5 After the survey has been completed, the Register will send to the Owner (or to the Company) all reports concerning performed survey. Each condition of class will be assigned a due date for completion.

For ships subjected to Enhanced Survey Programme an Executive Hull Summary of the survey and results is to be issued to the Owner (or to the Company) and placed on board the ship for reference at future surveys. The Executive Hull Summary is to be endorsed by the Head Office of the Register.

5.3.6 The Register may, in cases of serious deficiencies, suspend or withdraw existing ship’s Certificate of class and replace it with new certificate having reduced period of validity, during which such deficiencies are to be dealt with. In cases when deficiencies are of such extent that it is presumed that ship’s class, it’s safety and integrity, safety of the crew, passengers, or sea environment is endangered, the Register shall suspend or withdraw ship’s Certificate of class and shall require the ship to be surveyed in the first port of call where necessary repairs are to be carried out.

5.3.7 Certificate of class as well as other documents issued by the Register (such as reports on surveys performed) to the ship are to be kept on board for the lifetime of a ship and should be readily available for the Surveyor.

5.4 PERIOD OF VALIDITY

5.4.1 Period of validity of the Certificate of class (class term) is normally not longer than 5 (five) years.

5.4.2 When the Renewal survey is completed:

1. Within 3 (three) months before the expiry date of the existing Certificate of class, the new Certificate of class shall be valid from the date of completion of the Renewal survey to a date not exceeding allowable period of validity of the Certificate of class counting from the date of expiry of the existing certificate.

2. After the expiry date of the existing Certificate of class, the new Certificate of class shall be valid from the date of completion of the Renewal survey to a date not exceeding allowable period of validity of the Certificate of class counting from the date of expiry of the existing Certificate of class.

3. More than 3 (three) months before the expiry date of the existing Certificate of class, the new Certificate of class shall be valid from the date of completion of the renewal survey to a date not exceeding allowable period of validity of the Certificate of class counting from the date of completion of the Renewal survey.

5.5 EXTENSION OF THE PERIOD OF VALIDITY

5.5.1 Under "exceptional circumstances" the Register may grant an extension not exceeding 3 (three) months to allow for completion of the Renewal survey provided that the vessel is attended and that attending Surveyor(s) (refer to the Rules, Part I – General requirements, Chapter 5 - Surveys of ships in service, 3.2.9, also) so recommends after the following has been carried out:

1. Annual survey.
2. Re-examination of conditions of class.
3. Progression of the Renewal survey as far as practicable.

4. 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 condition of class regarding underwater parts.

5.5.2 In the case that the Certificate of class will expire when the ship is expected to be at sea, an extension to allow for completion of the Renewal survey may be granted, provided there is documented agreement to such an extension prior to the expiry date of the Certificate of class, and provided that positive arrangements have been made for attendance of the Surveyor at the first port of call, and provided that the Register is satisfied that there is technical justification for such an extension. Such an extension shall be granted only until arrival at the first port of call after the expiry date of the Certificate of class.

However, if owing to "exceptional circumstances" the Renewal survey cannot be completed at the first port of call, the requirements stated in 5.5.1 may be applied, but the total period of extension shall in no case be longer than 3 (three) months after the original due date of the Renewal survey.

IACS PR1C A.1.1.2

5.5.3 The period between inspections of the outside of the ship’s bottom may be extended for a period not exceeding 3 (three) months (or one month for ships engaged on short

4) "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.
vessels (voyages) when a Certificate of class is extended under provisions stated in 5.5.1.

5.5.4 However, no extension should be permitted of 36 (thirty-six) months between any two such inspections. If the first ship's bottom inspection is carried out between 24 (twenty-four) and 27 (twenty-seven) months, then the 36-month limitation may prevent the Certificate of class being extended by the periods permitted in 5.5.3.

5.5.5 Other requirements regarding bottom survey of the ship are stated in the Rules, Part I – General requirements, Chapter 5 - Surveys of ships in service, 2.4.

5.6 SUSPENSION AND REINSTATEMENT OF CLASS IN THE CASE OF OVERDUE SURVEYS

5.6.1 The Register will notify the Owner (or the Company) that the Certificate of class becomes invalid, and that classification is automatically suspended if the following is not complied with:

.1 When the Renewal survey has not been completed or is not under attendance for completion prior to resuming trading, by the due date.

IACS PR1C A.1.1

.2 When the Annual survey has not been completed within 3 (three) months of the due date of the annual survey, unless the vessel is under attendance for completion of the Annual survey.

IACS PR1C A.1.2

.3 When the Intermediate survey has not been completed within 3 (three) 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 Intermediate survey.

IACS PR1C A.1.3

Additionally, classification is automatically suspended and Certificate of class shall become invalid in the following cases also:

.4 When conversions or alternations are carried out without the approval of the Register (as stated in 3.6).

.5 If the Register has not been informed when the ship sustains damage or defect, as stated in 3.11.6.

.6 If the ship is not loaded and operated to the conditions or limitations stated in the Certificate of class and other pertinent documents (e.g. draught, area of navigation, sea state condition, type of cargo, main engine power output).

In above mentioned cases classification will be reinstated upon satisfactory completion of the surveys due. Such surveys are to be credited from the date originally due. However, the ship is disclassed from the date of suspension until the date class is reinstated.

Such surveys are to be carried out are to be credited from based upon the survey requirements at the original date due and not on the age of the vessel when the survey is carried out.

5.6.2 The ship's class will be subject to a suspension procedure in following cases:

.1 When Continuous survey items due or overdue at time of Annual or Intermediate survey, have not been dealt with or post-posted by agreement.

IACS PR1C A.1.4

.2 When recommendations or conditions of class have not been dealt with, or postponed by agreement.

IACS PR1C A.2

.3 When non-payment of fees occurs.

.4 When the Owner (Company) fails to notify the Register on the voyage repairs and maintenance duly in advance.

5.6.3 Vessels laid-up: Vessels laid-up in accordance with the 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.

IACS PR1C A.1.5

When a vessel is intended for a single voyage from laid-up position to repair yard 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 site of lay up to the repair yard, upon agreement with the Flag State Administration, provided the Register finds the vessel in satisfactory condition after surveys, the extent of which are to be based on surveys overdue and duration of lay-up. A short term Class Certificate with conditions for the intended voyage may be issued. This is not applicable to vessels whose class was already suspended prior to being laid-up.

IACS PR1C A.1.8

In cases where the vessel has been laid up or has been out of service for a considerable period of time because of a major repair or modification, and the Owner (Company) elects to carry out only overdue surveys, the next period of class will start from the expiry date of the Renewal survey. If the Owner (Company) elects to carry out the next due Renewal survey, the period of class will start from the survey completion date.

IACS UR27 2.1.3

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

.1 Examines the ship's records.
.2 Carries out the due and/or overdue surveys and examination of conditions of class at the first port of call when there is an unforeseen inability of the Register 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 Register 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).

The surveys to be carried out are to be based upon the survey requirements at the original date due and not on the age of the vessel when the survey is carried out. Such surveys are to be credited from the date originally due.

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

5.6.5 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 Certificate of class 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.

5.7 WITHDRAWAL OF CLASS

5.7.1 The decision to suspend or withdraw a ship's Certificate of class is made by the Head Office of the Register.

5.7.2 When the class of ship has been suspended for a period of 6 (six) months due to overdue surveys, recommendations and/or conditions of class, the class shall be withdrawn. A longer suspension period may be granted when the ship is not trading, as in cases of lay-up, awaiting disposition in case of casualty or attendance for reinstatement.

5.8 NOTIFICATION TO THE OWNERS AND FLAG STATES

5.8.1 The Register shall give timely notice to an Owner (or to a Company) about forthcoming surveys.

The omission of such notice however does not absolve the Owner (or the Company) from his responsibility to comply with Register's survey requirements for maintenance of class.

5.8.2 The Register shall confirm in writing the suspension of class and reinstating the ship's class to the Owner (Company) and to the Flag State.

5.8.3 The Register shall confirm in writing the withdrawal of class to the Owner (Company) and to the Flag State.

5.8.4 For ships constructed on or after 1st July 1998 under SOLAS, Reg. II-1/3.1, confirmations according to 5.8.2 and 5.8.3 are to state that certain statutory certificates are implicitly invalidated by suspension / withdrawal of class.

5.9 SUSPENSION AND REINSTATEMENT OF CLASS IN THE CASE OF OVERDUE RECOMMENDATIONS / CONDITIONS OF CLASS

5.9.1 Each condition of class will be assigned a due date for completion. The Register will notify the Owner of these dates and that the ship's class will be subject to a suspension procedure if the item is not dealt with, or postponement by agreement, by the due date.

Classification will be reinstated upon verification that the overdue recommendation / conditions of class have been satisfactorily dealt with, as stipulated for each particular case in 5.6.1, 5.6.2, 5.6.3, 5.6.4 or 5.6.5.

Such surveys are to be credited from the date originally due.

5.9.2 However, the ship shall be classed from the date of suspension until the date when the validity of the Certificate of class has been reinstated.

5.10 DOUBLE CLASSED VESSELS

5.10.1 A double class ship is one which is classed by two class societies, where each one works as if it is the only society classing the ship, and does all surveys in accordance with its own requirements and schedule.

5.11 SUSPENSION AND REINSTATEMENT OF CLASS IN THE CASE OF DUALLY CLASSED VESSELS

5.11.1 A dually classed vessel is one which is simultaneously classed by the Register and some other recognised classification society and where, when one of the societies undertakes class surveys, it also acts on behalf of the other society.

5.11.2 When a vessel is dually 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 working days.
5.13 Assigning the date of build

5.13.1 The Certificate of class and the Register Book shall indicate the “Date of Build” as defined below:

.1 For New Construction - the year, month and day 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.

.2 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 is involved, the following shall apply:

a) the “Date of Build” associated with each major portion of the ship shall be indicated, where it has been agreed that the newer structure shall be on a different survey cycle;

b) survey requirements shall be based on the “Date of Build” associated with each major portion of the ship;

c) survey due dates may be aligned at the discretion of the Register.

5.14 Date of contract for construction

The Rules that will be applied for class assignment to new construction are generally those being at force at the date of "contract for construction". For the purpose of defining the date of "contract of construction", the following shall apply:

5.14.1 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 classification society by the party applying for the assignment of class to a newbuilding.

5.14.2 The date of "contract of 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 the Rules, 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 Register for approval.

The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 (one) year after the contract to build the series was signed.

5.14.3 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 5.14.1 and 5.1.4.2 above apply.

5.14.4 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.

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.
5.15 DATE OF INITIAL CLASSIFICATION

5.15.1 As a general rule, for newbuildings the date of initial classification coincides with date of build.

5.15.2 For the definition of the date of initial classification for existing ships see the Rules, Part 1 – General requirements, Chapter 2 - Survey during construction and initial survey, 2.5.

5.16 DATE OF DELIVERY UNDER SOLAS AND MARPOL CONVENTIONS

Interpretation
Under certain provisions of the SOLAS and MARPOL Conventions, the application of regulations to a new ship is governed by the dates:

.1 For which the building contract is placed on or after dd/mm/yyyy, or
.2 In the absence of a building contract, the keel of which is laid or which is at a similar stage of construction on or after dd/mm/yyyy, or
.3 the delivery of which is on or after dd/mm/yyyy.

For the purpose of determining the application of mandatory requirements of the SOLAS and MARPOL Conventions to a new ship, the date of "delivery" means the completion date (day, month and year) of the survey on which the certificate is based (i.e. the initial survey before the ship is put into service and certificate issued for the first time) as entered on the relevant statutory certificates.

IACS UI SC256, IACS UI MPC100

NOTE: For the sake of interpretation of performance standards for Voyage Data Recorders (VDRs) under IMO Res. MSC.333(90) regarding the term "installed on or after 1 July 2014" provisions of IACS UI SC261 should be followed. However, and notwithstanding above stated the Register will, before applying IACS UI SC261, require a specific written instruction of this interpretation from the Flag State Administration.

IACS UI SC261

5.17 KEEL LAYING DATE

Interpretation
For the purpose of the application of the IMO Conventions and Codes (Performance Standards, Technical Standards, Resolutions and Circul ars) for:

.1 Steel ships the term "the keel of which is laid or which is at a similar stage of construction" should be interpreted under provisions of MSC-MEPC.5/Circ.8. The term "under similar stage of construction" means the stage at which:
   a) construction identifiable with a specific ship begins; and
   b) assembly of that ship has commenced comprising at least 50 tonnes or one per cent of the estimated mass of all structural material, whichever is less.

.2 Fibre-Reinforced Plastic (FRP) Craft, the term "the keel of which is laid or which is at a similar stage of construction" should be interpreted as the date that the first structural reinforcement of the complete thickness of the approved hull laminate schedule is laid either in or on the mould.

IACS UI HSC9, IACS UI LL78, IACS UI MPC104
6 APPLICATION OF STATUTORY REQUIREMENTS

6.1 When authorized by the Flag State Administration concerned, the Register will act on its behalf within the limits of such authorization. In this respect, the Register will take into account the relevant national requirements, survey the ship and issue or contribute to issue of the corresponding certificates.

6.2 The above surveys do not fall within the scope of the classification of ships, even though their scope may overlap in part and may be carried out concurrently with surveys for assignment or maintenance of class.

6.3 In the case of a discrepancy between the provisions of the applicable international and national regulations and those of the Rules, the former shall take precedence.

6.4 In statutory matters in the course of statutory certification on behalf of Flag State Administrations the Register applies available IACS Unified Interpretations (IACS UI).

Notwithstanding above stated, IACS UIs shall only be applied to ships whose Flag State Administrations have not issued different and/or definite instructions on the interpretations of IMO regulations concerned, i.e. when the Flag State Administration has not provided written instruction to apply different interpretation.

The Register ensures the application of IACS UIs:

1. with direct inclusion of IACS UIs in the Rules for the classification of ships of the Register, or
2. with appropriate provision in the contracts for statutory certification services with the Flag State Administrations, or
3. with inclusion of a requirement, in the Rules for the classification of ships of the Register mandating compliance with particular IACS UI.

This does not require the application of IACS UIs to ships retroactively, except for those UIs which explicitly require retroactive application.

IACS PR31

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

2. International Convention for the Safety of Life at Sea, 1974 (SOLAS 74),
3. International Convention on Tonnage Measurement of Ships (TMC 69),
5. International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code),

8. Applicable conventions of the International Labour Organization (ILO),
9. International Convention On The Control Of Harmful Anti-Fouling Systems On Ships,
11. Convention for the Control and Management of Ships’ Ballast Water and Sediments,

and applicable amendments thereto, the Register requires that the applicable statutory certificates are to be issued by the Register, Flag State Administration, or by some other recognised organisation if so authorised by the Flag State Administration.

6.6 In the case of dually or double classed ships, statutory certificates may be issued by the other classification society with which the ship is classed, provided that this is recognized in a formal dual or double class agreement with the Register, and provided that the other classification society is authorized by the relevant Flag State Administration.
7 EXTERNAL AUDITS / INSPECTIONS

7.1 In cases of external audits or inspections of processes of the Register, for the certification of the Register and in order to verify compliance of such processes against applicable rules, regulations and quality standards, and in addition to stated in 3.12, the following parties have for access to the information:

.1 authorised representatives of the Flag State Administration;
.2 authorised audit teams (i.e. Accreditation Body or EC auditors).

NOTE: According to the Regulation (EC) No. 391/2009 of the European Parliament and of the Council on common rules and standards for ship inspection and survey organisations, the issue of statutory certificates or class certificates to a ship is conditional on the parties not opposing the access of the Commission inspectors on board ships for the purposes of Article 8(1) of said Regulation.

7.2 For that purpose representatives / auditors may accompany Surveyors of the Register at any stage of their classification and/or statutory work, which may necessitate the representatives / auditors having free access to the ship, or to the premises of the manufacturer / shipbuilder. Shipowners, Companies, Shipyards or manufacturers shall provide representatives / auditors with the safe access to the premises / ship.
Addendum Notice to PR1C

Procedure for Suspension and Reinstatement or Withdrawal of Class in Case of Surveys, Conditions of Class or Recommendations Going Overdue

For the duration as shown in the validity section below, Paragraph A.1.7 in this document overrides that shown in PR1C Rev.5

A.1.7 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 surveys can be completed at the expiry of the periods allowed above, the Society may allow the vessel to sail, in class, for a period not exceeding three (3) months, to allow for completion of the surveys, provided the Society:

a) examines the ship’s records.

b) carries out the due and/or overdue surveys and examination of Recommendations / Conditions of Class at the first opportunity where the Society is reasonably able to attend to complete the surveys, and

c) has satisfied itself that the vessel is in condition to satisfactorily continue in service for the agreed period, and

d) receives a signed statement from the master to confirm that their ship is in a condition to satisfactorily continue in service for the agreed period.

The society may postpone the surveys and issue interim/short term certificates as appropriate.

The surveys to be carried out are to be based upon the survey requirements at the original date due and not on the age of the vessel when the survey is carried out. Such surveys are to be credited from the date originally due.

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

Validity Notice

Valid until 30th June 2020

To be reviewed by IACS Council in the beginning of June 2020 and decide whether to further extend the validity or to revoke the notice.
REVIEW OF AMENDMENTS IN RELATION TO PREVIOUS EDITION OF THE RULES

RULES FOR THE CLASSIFICATION OF SHIPS
Part 1 - GENERAL REQUIREMENTS
Chapter 2 – Survey during construction and initial survey

All major changes in respect to Rules for the classification of ships, Part 1 – General requirements, Chapter 2 – Survey during construction and initial survey, edition January 2019, including Corrigenda No. 1, throughout the text are shaded (if any).

Items not being indicated as corrected have not been changed.
The grammar and print errors, have been corrected throughout the Rules and are not subject to above indication of changes.
The subject Chapter of this part of the Rules includes the requirements of the following international Organisations:

**International Maritime Organization (IMO):**

**Resolutions:**  MEPC.269(68) 2015 Guidelines for the development of the inventory of hazardous materials

**Circulars:**  MSC/Circ.1142/MEPC/Circ.425 Marking the ship's plans, manuals and other documents with the IMO identification number  
MSC/Circ.1135 As-built construction drawings to be maintained on board the ship and shore  
MSC.1/Circ.1379 Unified interpretation of SOLAS Regulation II-1/3-5

**International Association of Classification Societies (IACS):**

**Unified Requirements (UR):**  
S14 (rev. 6, Sep 2016), Z23 (rev. 6, Nov 2016)

**Procedural Requirements (PR):**  
PR1A (rev. 6, Jan 2019), PR1D (rev. 1, Jan 2019)

**Unified Interpretations (UI):**  
## Chapter 2  
**SURVEY DURING CONSTRUCTION AND INITIAL SURVEY**

Contents:

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SURVEY DURING CONSTRUCTION</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>GENERAL REQUIREMENTS</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>TECHNICAL DOCUMENTATION</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>SURVEY DURING CONSTRUCTION OF HULL, BUILDING IN OF MACHINERY, INSTALLATIONS AND EQUIPMENT</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>REQUIREMENTS FOR TESTING DURING CONSTRUCTION</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td>INITIAL CLASS ENTRY SURVEY OF EXISTING SHIPS - ADMISSION TO CLASS</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>GENERAL</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>SHIPS NOT CLASSED WITH THE RECOGNIZED CLASSIFICATION SOCIETY</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>SHIPS CLASSED WITH THE RECOGNIZED CLASSIFICATION SOCIETY</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>SHIPS OF LESS THAN 100 GROSS TONNAGE</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>DATE OF INITIAL CLASSIFICATION FOR EXISTING SHIPS</td>
<td>20</td>
</tr>
</tbody>
</table>
1 SURVEY DURING CONSTRUCTION

1.1 GENERAL REQUIREMENTS

1.1.1 This Section of this Chapter of the Rules prescribes requirements for survey during construction for the purpose of classification of newbuildings, directly comprising the following:

.1 Approval of technical documentation of the ship.
.2 Survey at the premises of the manufacturer during manufacture of the materials, machinery, installations and equipment to be installed on board ship.
.3 Survey during construction of the ship at the premises of the shipyard, as stated in 1.3.
.4 Survey during sea-trials and final tests.
.5 Issuing of the Certificate of class upon satisfactory completion of the survey.

This Section of the Rules is applicable to all ships or floating units, irrespective of their size or navigation area, when being built under survey of the Register for the purpose of assigning appropriate class notation.

Nevertheless, the Register reserves the right to make justified deviation from this requirements, when survey during construction is desired for ships not to be engaged in international voyages. As a rule, such deviations will not be accepted in respect to structural strength, intact stability, machinery installations and electrical equipment covered by main class notations.

Compliance with class related requirements does not relieve the interested party from compliance with any statutory requirement demanded by the Flag State Administration.

Before starting any activities related to construction, it is necessary to submit the "Request for survey during construction" to the Head Office of the Register.

This Section of this Chapter of the Rules shall also apply to shipyard subcontractors, when performing fabrication works which are falling under the scope of classification survey as defined in the following paragraphs.

Major modifications and conversions, significant repairs, modifications or alterations, change of navigation area or number of passengers

1.1.2 Activities which are foreseen to be undertaken in a view of:

.1 major modifications or conversions (see Chapter 1 - General requirements, 2.22); or
.2 significant repairs; or
.3 modifications or alternations of the equipment; or
.4 change of navigation area; or
.5 change of number of passengers;

directly comprises activities required for newbuildings, as specified in 1.1.1, also, in extent as deemed necessary and reasonable by the Register, considering each specific case separately.

Conversion of existing vessel to a passenger ship

1.1.3 In cases when existing vessel, irrespectively of the date of built and its navigation area, is converted into passenger ships, requirements as for new passenger ships are to apply.

Technical documentation

1.1.4 The list of technical documentation, which is to be submitted for information or approval, shall be previously agreed with the Register, prior to commencement of delivery of such technical documentation, for each particular ship.

1.1.5 The list of technical documentation which is to be submitted to the Register for information is stated in 1.2.1 (and where explicitly stated otherwise), while the list of technical documentation, which is to be submitted for approval, is stated in 1.2.2 to 1.2.11.

The following documentation shall be submitted:

.1 Drawings, plans and specifications as required by the relevant parts of the Rules.
.2 Corresponding technical descriptions, calculations and data, including material specifications.
.3 Outline specification of the ship.

The extent of technical documentation for the ships having special design features is to be determined for every such ship in agreement with the Register.

Notwithstanding above stated, the Register reserves the right to ask for additional documentation which considers necessary.

1.1.6 Technical documentation is to be submitted to the Register for information or approval in three copies, unless required or agreed otherwise.

Technical documentation is to be submitted to the Register, for information or approval, duly in advance of starting the construction, or exceptionally, duly in advance prior to commencement of particular phase of the construction of the ship, which is to be specially arranged with the Register.

All information which may influence the judgement and decisions made by the Register during the process of approval is to be made available to the Register. It is the responsibility of the shipbuilder to ensure that such information is brought to the attention of the Register in time.

For ships to be engaged on international voyages technical documentation is to be submitted in English (mandatory).

1.1.7 Technical documentation is to be produced in the manner of common good shipbuilding practice and is to be elaborated and completed with all necessary data to make checking whether ship complies with the requirements of the Rules possible.

In the case of conflicting information, submitted documentation will be considered in the following order for precedence: design data, plans, design and calculation.
1.1.8 The documentation forming the basis for the survey is, at all times, to reflect the true conditions. Revisions of documents are therefore to be submitted to the Register to the extent such revisions may influence decisions or statements made by the Register.

Revisions of already approved documentation are to be submitted to the Register for approval prior to being realised. Such documentation is to be specially marked to identify revisions made.

1.1.9 Where applicable, approval of technical documentation is to be confirmed by the seal of the Register. Conditions and restrictions, deriving from plan approval, and relevant for a specific document may be indicated on the technical documentation itself and/or on the pertinent appraisal letter.

The approval does not refer to the parts and construction details, contained in the approved technical documentation, which are not covered by the Rules.

1.1.10 If subsequent information indicates that the design solutions are against the requirements of the Rules, the Register may revoke approval of the technical documentation at any time.

1.1.11 It is the responsibility of the shipyard to ascertain that drawings used for procurement, construction and other works (shop drawings) are in accordance with the technical documentation approved by the Register.

1.1.12 The Register may, at its discretion and subject to conditions and checks deemed appropriate, accept the plans and documentation approved by other class society, being IACS member, as far as classification is concerned and according to the principle of equivalence of Rules and other works are in accordance with the approved plans, i.e. the Register may consider the acceptance of alternatives to these Rules, provided that they are deemed to be equivalent to the Rules to the satisfaction of the Register.

1.1.13 Technical documentation (plans, manuals and other documents) which is required to be carried on board ships on international voyages constructed on or after 1st July 2005, according to IMO MSC/Circ.1142/MEPC/Circ.425 (Marking the ship's plans, manuals and other documents with the IMO identification number) should be marked with IMO ship identification number 1) in clearly legible and unambiguous manner. The originator of such technical documentation should ensure that the IMO ship identification number is marked on it prior to submission for approval to the Register.

1.1.14 As required by IMO MSC/Circ.1135 (As-built construction drawings to be maintained on board the ship and ashore) on completion of survey during construction, as required by 1.1.13, the following technical documentation with IMO identification number entered is to be maintained on board the ship and ashore:

.1 General arrangement plan.
.2 Capacity plan.
.3 Stability file and hydrostatic curves.
.4 Loading Manual, where required.

.5 Midship section, with dimensions of main structural elements entered.
.6 Scantling plan.
.7 Decks.
.8 Shell expansion.
.9 Transverse bulkheads.
.10 Rudder and rudder stock.
.11 Cargo hatch covers, where applicable.
.12 Bilge, ballast and cargo piping diagrams.

Field survey at the premises of the shipyard

1.1.15 During construction, the Surveyor should have safe access to all works directly or indirectly affecting classification survey during construction. In that respect the shipyard is to provide necessary facilities and safe working environment for the safe execution of the survey. This includes, inter alia, provision of the suitable and safe means of access, i.e. scaffolding, working platforms and related equipment, illumination, ventilation, temporary barriers, guard-rails or other equivalent arrangements to prevent falling down, as well as posting of warnings on possible danger from objects falling from the working areas. Safety measures and arrangements to be applied should be agreed between the shipyard and the Register in advance, prior starting surveying activities.

NOTE: For additional requirements related to safety of Surveyors the following may be considered also (as far as applicable): IACS Recommendation 91 - "Guidelines for acceptance / approval of alternative means of access"; IACS Recommendation 78 - "Safe use of portable ladders for close-up survey"; IACS Recommendation 72 - "Confined space safe practice", EU Directive 2001/45/EC, amending Council Directive 89/655/EEC concerning the minimum safety and health requirements for the use of work equipment by workers at work.

It is the duty of the shipyard to duly notify and arrange with the local Branch office of the Register on surveys and testing to be performed, as each phase during construction, which is to be inspected by the Register, is completed.

After such notification the Surveyor will inspect the work performed in order to establish whether the requirements of the Rules have been met.

The scope of survey will be decided by the Register based on elements such as experience feedback, patrolling and spot checks. The survey may consist of a combination of visual inspections, witnessing during tests and measurement and review of records.

For hull surveys of ships falling under the provisions of IACS UR Z23 - "Hull survey of newconstruction" specific survey requirements are to be applied. For that purpose the shipyard is to comply with the criteria given in UR Z23 and shall provide documentation stated therein. Shipyard subcontractors are also to comply with IACS UR Z23.

For requirements related to survey during construction of hull, building in of machinery, installations and equipment see 1.3 also.

For requirements related to testing during construction see 1.4 also.

Testing program

1.1.16 During construction of the ship, the shipyard is to develop a Testing Program (functional testing program) to
the satisfaction of the Register. This Program is to include testing during harbour and sea trials.

This Program is to specify systems, arrangements and equipment which are to be tested together with testing during harbour and sea trials. Such tests shall give evidence as to satisfactory operation and performance in accordance with the Rules.

In order to verify compliance with the Rules, the Register reserves the right to request additional tests to be conducted.

Materials and products

1.1.17 For the purpose of survey during construction, all materials, machinery, auxiliary installations, equipment, etc., which are covered by classification and to be installed on board ship are to be new, and where applicable are to be surveyed during production at the premises of the manufacturer, what in certain cases requires approval of the technical documentation also.

1.1.18 Second hand materials, machinery, auxiliary installation, equipment, etc., may be used subject to approval of the Register, for each particular case, but limited to class related items only, under presumption that such second hand items are complying with the applicable Rules for newbuildings, including statutory requirements where relevant, and provided that the Owner has given a written acceptance.

Defects and damages originated during construction and their repairs

1.1.19 The Register may, at any time, reject items found to be defective or contrary to rule requirements or require supplementary inspections and tests and/or modifications, notwithstanding any previous certificates issued.

1.1.20 All repairs are subject to the preliminary agreement of the Register. When the limits of tolerance for defects are specified in the Rules concerned or by the manufacturer, they are to be taken into account for repairs.

1.1.21 It is incumbent upon the shipyard to notify the Register of any defects noted during the construction of the ship and/or of any item not complying with the applicable requirements or in any case unsatisfactory. Proposals regarding remedial actions intended to be adopted to eliminate such defects or unsatisfactory items are to be submitted to the Register and, if accepted, carried out to the Surveyor’s satisfaction.

1.1.22 Guidance to general welding repair work is given in IACS Recommendation No. 47 - "Shipbuilding and Repair Quality Standard", SARQS, Part A.

Other requirements

1.1.23 As a prerequisite for construction of ships with hull made from fibre-reinforced plastics suitability of the builder (workshop) for performance of such works is to be certified by the Register through relevant builder (workshop) approval.

1.1.24 Welding on steel or aluminium structures is to be performed by approved welders using approved welding consumables and according to approved welding procedures (see the Rules, Part 26 - Welding, 1).

1.1.25 For the requirements related to survey during construction of ships made of wood, aluminium alloys or reinforced plastics see the Rules for technical supervision of ships made of wood, aluminium alloys and reinforced plastics, Part A, Chapter 2 and Part B, Chapter 1, Chapter 2, Chapter 3, Chapter 4 and Chapter 5.

1.1.26 For the requirements related to survey during construction of fishing vessels see the Rules for statutory certification of fishing vessels, Part A, Chapter 2 and Part B, Chapter 3, Chapter 4 and Chapter 5.

Date of initial classification for newbuildings

1.1.27 As a rule, for newbuildings the date of initial classification coincides with the date of build.

Ships built under dual class agreement with other IACS member class society

1.1.28 If the survey during construction is being performed on the ship dually classed with other IACS member class society a specific protocol shall be developed and agreed between the Register, other class society and the shipyard to ease the survey procedure (comprising both plan approval activities and field survey at the premises of the shipyard). Such protocol is to be developed and agreed prior starting the project.

Implementation of SOLAS II-1, Regulation 3-5 and MSC.1/Circ.1379

1.1.29 Prohibition of the installation of asbestos (SOLAS Ch. II-1, Reg. 3-5): From 1st January 2011, for all ships, new installation of materials which contain asbestos shall be prohibited.

IMO MSC.1/Circ.1379 (Unified interpretation of SOLAS Regulation II-1/3-5)): From 1st January 2011, for all ships, new installation of materials which contain asbestos shall be prohibited. In the context of this regulation, new installation of materials containing asbestos means any new physical installation on board. Any material purchased prior to 1st January 2011 being kept in the ship’s store or in the shipyard for a ship under construction, should not be permitted to be installed after 1st January 2011 as a working part.

Interpretation

NOTE: For additional clarification the following interpretation of MSC.1/Circ.1379 should be applied:

1. Verification that “new installation of materials which contain asbestos” under SOLAS, Reg. II-1/3-5 requires the Register to review asbestos-free declarations and supporting documentation, for the structure, machinery, electrical installations and equipment covered by the SOLAS Convention, which is to be provided to the Register, by repair yards, and equipment manufacturers taking into account Appendix 8 of the 2015 Guidelines for the development of the inventory of hazardous materials (IMO Res. MEPC.269(68)) for:
- new construction (keel laid, or at a similar stage of construction, on or after 1st July 2012);

2) For more requirements regarding prohibition of the installation of asbestos, as well as regarding requirements related to ship recycling refer to the Rules for technical supervision of sea-going ships, Part 32 – Ship recycling.
2. The phrase “new installation of materials containing asbestos” in MSC.1/Circ.1379:
- means that material used (i.e., repaired, replaced, maintained or added) as a working part of the ship as per “indicative list” of products which is installed on or after 1st July 2012 is required to be documented with an asbestos-free declaration.
The Register will, in consultation with the Company’s nominated person responsible to control asbestos containing material onboard, as per the Safety Management System in accordance with IMO MSC/Circ.1045 (Guidance for maintenance and monitoring of on-board materials containing asbestos), audit this documentation during annual safety construction and safety equipment surveys; and
- does not preclude the stowage of material which contains asbestos onboard (e.g., spare parts existing on board as of 1st July 2012).

3. The phrase “should not be permitted to be installed after 1 January 2011 as a working part” in IMO MSC.1/Circ.1379 means that replacement, maintenance or addition of materials used for the structure, machinery, electrical installations and equipment covered by the SOLAS Convention which contain asbestos is prohibited.

4. The “indicative list” of products that are presumed that might contain asbestos is given in IMO Res. MEPC.269(68), Appendix 5, paragraph 2.2.3.2, as listed below:

<table>
<thead>
<tr>
<th>Structure and/or equipment</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propeller shafting</td>
<td>Packing with low pressure hydraulic piping flange</td>
</tr>
<tr>
<td></td>
<td>Packing with casing</td>
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<tr>
<td></td>
<td>Clutch Brake lining</td>
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<tr>
<td></td>
<td>Synthetic stern tubes</td>
</tr>
<tr>
<td>Diesel engine</td>
<td>Packing with piping flange</td>
</tr>
<tr>
<td></td>
<td>Lagging material for fuel pipe</td>
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<tr>
<td></td>
<td>Lagging material for exhaust pipe</td>
</tr>
<tr>
<td></td>
<td>Lagging material turbocharger</td>
</tr>
<tr>
<td>Turbine engine</td>
<td>Lagging material for casing</td>
</tr>
<tr>
<td></td>
<td>Packing with flange of piping and valve for steam line, exhaust line and drain line</td>
</tr>
<tr>
<td></td>
<td>Lagging material for piping and valve of steam line, exhaust line and drain line</td>
</tr>
<tr>
<td>Boiler</td>
<td>Insulation in combustion chamber</td>
</tr>
<tr>
<td></td>
<td>Packing for casing door</td>
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<tr>
<td></td>
<td>Lagging material for exhaust pipe</td>
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<tr>
<td></td>
<td>Gasket for manhole</td>
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<tr>
<td></td>
<td>Gasket for hand hole</td>
</tr>
<tr>
<td></td>
<td>Gas shield packing for soot blower and other hole</td>
</tr>
<tr>
<td></td>
<td>Packing with flange of piping and valve for steam line, exhaust line, fuel line and drain line</td>
</tr>
<tr>
<td></td>
<td>Lagging material for piping and valve of steam line, exhaust line, fuel line and drain line</td>
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<thead>
<tr>
<th>Structure and/or equipment</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhaust gas economizer</td>
<td>Packing for casing door</td>
</tr>
<tr>
<td></td>
<td>Packing with manhole</td>
</tr>
<tr>
<td></td>
<td>Packing with hand hole</td>
</tr>
<tr>
<td></td>
<td>Packing with flange of piping and valve for steam line, exhaust line, fuel line and drain line</td>
</tr>
<tr>
<td></td>
<td>Lagging material for piping and valve of steam line, exhaust line, fuel line and drain line</td>
</tr>
</tbody>
</table>

| Incinerator                | Packing for casing door                            |
|                            | Packing with manhole                               |
|                            | Packing with hand hole                             |
|                            | Lagging material for exhaust pipe                  |

| Auxiliary machinery (pump, compressor, oil purifier, crane) | Packing for casing door and valve |
|                                                            | Gland packing                                |
|                                                            | Brake lining                                 |

| Heat exchanger            | Packing with casing                             |
|                            | Gland packing for valve                          |
|                            | Lagging material and insulation                  |

| Valve                      | Gland packing with valve, sheet packing with piping flange |
|                            | Gasket with flange of high pressure and/or high temperature |

| Pipe, duct                | Lagging material and insulation                  |

| Tank (fuel tank, hot water, tank, condenser), other equipment (fuel strainer, lubricant oil strainer) | Lagging material and insulation |

| Electric equipment         | Insulation material                             |
|                            | Wall, ceiling                                   |

| Airborne asbestos          | Ceiling, floor and wall in accommodation area   |
|                            | Ceiling, floor, wall                           |

| Fire door                  | Packing, construction and insulation of the fire door |
|                            | Packing for casing, etc.                        |

| Inert gas system           | Sheet packing, lagging material for piping and flexible joint |

| Miscellaneous              | Ropes                                           |
|                            | Thermal insulating materials                    |
|                            | Fire shields/fire proofing                      |
|                            | Space/duct insulation                           |
|                            | Electrical cable materials                     |
|                            | Brake linings                                  |
|                            | Floor tiles/deck underlay Steam/water/vent flange gaskets |
|                            | Adhesives/mastics/fillers                      |
|                            | Sound damping                                  |
|                            | Moulded plastic products                       |
|                            | Sealing putty                                  |
|                            | Shaft/valve packing                            |
|                            | Electrical bulkhead penetration packing         |
|                            | Circuit breaker arc chutes                     |
|                            | Pipe hanger inserts                            |
|                            | Weld shop protectors/burn covers               |
|                            | Fire-fighting blankets/clothing/equipment      |
|                            | Concrete ballast                               |

IACS U/I SC.249
Application of Load Line Requirements to Conversions of Single-hull Oil Tankers to Double-hull Oil Tankers or Bulk Carriers

1.1.30 This requirement is based on IACS UI LL77 and is applicable to conversions of single-hull oil tankers to double-hull oil tankers or bulk carriers and falling under provision of the International Convention on Load Lines, 1966, as amended, which occur on or after 1st January 2013, when the Register acts as Recognized organization on behalf of the Flag State Administration.

Article 10 - Repairs, alterations and modifications

(1) A ship which undergoes repairs, alterations, modifications and outfitting related thereto shall continue to comply with at least the requirements previously applicable to the ship. An existing ship in such a case shall not, as a rule, comply to a lesser extent with the requirements for a new ship than it did before.

(2) Repairs, alterations and modifications of a major character and outfitting related thereto should meet the requirements for a new ship in so far as the administration deems reasonable and practicable.

NOTE: For additional clarification the following interpretation should be applied:

1. For single-hull oil tankers converted to double-hull oil tankers:

1.1 The ship should meet the requirements of the regulations contained in chapter III (Freeboards) of Annex I of the Load Line Convention in effect at the date of conversion. In cases where there are no changes to the parameters which result in a change of the minimum freeboard 3), and where there is no decrease in magnitude of freeboard assigned after conversion, using the Convention previously applicable to the ship in determining any change or decrease as mentioned above, the converted ship should continue to comply with at least the requirements previously applicable to the ship.

1.2 Any structure and/or equipment such as doors, hatches, and cable lockers, etc., which is newly added, replaced, or modified is to comply with the requirements of the regulations contained in chapter II (Conditions of assignment of freeboard) of Annex I of the Convention in effect at the date of conversion.

2. For single-hull oil tankers converted to bulk carriers:

2.1 Any such conversion should be regarded as a modification of a major character and the ship should meet all the requirements of the regulations annexed to the Convention (including regulation 39) in effect at the date of conversion; and

2.2 Notwithstanding the above, the requirements of the regulations contained in chapter II (Conditions of assignment of freeboard) of Annex I of the Convention in effect at the date of conversion, should be applied only to the structure and/or equipment, which is newly added, replaced, or modified.

3. The date on which a conversion occurs for the purposes of determining the applicability of requirements for ships constructed on or after the date on which any relevant amendments enters into force should be:

3.1 the date on which the contract is placed for the conversion; or
3.2 in the absence of a contract, the date on which the work identifiable with the specific conversion begins; or

3) “which result in a change of the minimum freeboard” should be understood as “which are used in determining the minimum freeboard even though the minimum freeboard has no change in fact”

3.3 the completion date of the conversion 4), if that occurs more than 3 years after the date specified in subparagraph 3.1 above or 30 months after the date specified in subparagraph 3.2 above, either as applicable.

IACS UI SC LL77

4) Where the completion date of the conversion has been subject to delay beyond the period referred to in paragraph 3.3 above due to unforeseen circumstances beyond the control of the builder and the owner, the other dates referred to in paragraph 3.1 or 3.2 above, if applicable, may be accepted by the Flag State Administration in lieu of the completion date of the conversion in accordance with MSC-MEPC.1/Circ.1247.
Application of SOLAS Regulations to Conversions of Single-hull Oil Tankers to Double-hull Oil Tankers or Bulk Carriers

1.1.31 This requirement is based on IACS UI SC226 and is applicable to conversions of single-hull oil tankers to double-hull oil tankers or bulk carriers and falling under provision of the SOLAS, which occur on or after 1st January 2014, when the Register acts as Recognized organization on behalf of the Flag State Administration.

<table>
<thead>
<tr>
<th>No.</th>
<th>Regulation</th>
<th>Title / Content</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>II-1/1.3</td>
<td>Alterations and modifications of a major character</td>
<td>As amended by MSC.216(82)</td>
</tr>
<tr>
<td>2</td>
<td>II-1/3.2, 2 &amp; 3.2, 4</td>
<td>Protective coatings of dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers</td>
<td>As amended by MSC.216(82)</td>
</tr>
<tr>
<td>3</td>
<td>II-1/3-6</td>
<td>Access to and within spaces in, and forward of, the cargo area of oil tankers and bulk carriers</td>
<td>As amended by MSC.194(80)</td>
</tr>
<tr>
<td>4</td>
<td>II-1/3-8</td>
<td>Towing and Mooring Equipment</td>
<td>As amended by MSC.194(80)</td>
</tr>
<tr>
<td>5</td>
<td>II-1/Part B &amp; Part B1</td>
<td>Subdivision and stability</td>
<td>As amended by MSC.216(82)</td>
</tr>
<tr>
<td>6</td>
<td>II-2/1.3</td>
<td>Repairs, alterations, modifications and outfitting</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>III-1.4.2</td>
<td>Alterations and modifications of a major character</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>III/31.1.8</td>
<td>Survival craft and rescue boats</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>V/22</td>
<td>Navigation bridge visibility</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>XII/4</td>
<td>Damage stability requirements applicable to bulk carriers</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>XII/5.1 &amp; 5.2</td>
<td>Structural strength of bulk carriers</td>
<td>-</td>
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<td></td>
<td>XII/6.1</td>
<td>Structural and other requirements for bulk carriers</td>
<td>-</td>
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<td></td>
<td>XII/6.2</td>
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<td>-</td>
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<td>XII/6.3</td>
<td>Structural and other requirements for bulk carriers</td>
<td>As amended by MSC.216(82), Annex 1</td>
</tr>
<tr>
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<td>XII/6.4</td>
<td>Structural and other requirements for bulk carriers</td>
<td>As amended by MSC.216(82), Annex 1</td>
</tr>
<tr>
<td></td>
<td>XII/7.1</td>
<td>Survey and maintenance of bulk carrier</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>XII/7.2</td>
<td>Survey and maintenance of bulk carrier</td>
<td>-</td>
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<tr>
<td></td>
<td>XII/8</td>
<td>Information on compliance with requirements for bulk carriers</td>
<td>-</td>
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<tr>
<td></td>
<td>XII/9</td>
<td>Requirements for bulk carriers not being capable of complying with regulation 4.3 due to the design configuration of their cargo holds</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>XII/10</td>
<td>Solid bulk cargo density declaration</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>XII/11</td>
<td>Loading instrument</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>XII/12</td>
<td>Hold, ballast and dry space water ingress alarms</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>XII/13</td>
<td>Availability of pumping systems</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>XII/14</td>
<td>Restrictions from sailing with any hold empty</td>
<td>-</td>
</tr>
</tbody>
</table>

1.1.31.1 Alterations and modifications of a major character SOLAS Ch. II-1 Reg. 1.3 (as amended by MSC.216(82))

SOLAS Ch. II-1, Reg. 1 ‘Application’:

‘3 All ships which undergo repairs, alterations, modifications and outfitting related thereto shall continue to comply with at least the requirements previously applicable to these ships. Such ships, if constructed before the date on which any relevant amendments enter into force, shall, as a rule, comply with the requirements for ships constructed on or after that date to at least the same extent as they did before undergoing such repairs, alterations, modifications or outfitting. Repairs, alterations and modifications of a major character and outfitting related thereto shall meet the requirements for ships constructed on or after the date on which any relevant amendments enter into force, in so far as the Administration deems reasonable and practicable.’

Interpretation

1. The date on which a conversion occurs for the purposes of determining the applicability of requirements for ships constructed on or after the date on which any relevant amendments enter into force is to be: .1 the date on which the contract is placed for the conversion; or
2. As for paragraph 1 above, the following applies:

1. Where the completion date of the conversion has been subject to delay beyond the period referred to in paragraph 1.3 above due to unforeseen circumstances beyond the control of the builder and the owner, the date on which the contract is placed for the conversion or, if applicable, the date on which the work identifiable with the specific conversion begins may be accepted by the Administration in lieu of the completion date of the conversion. The treatment of such ships is to be considered by the Administration on a case-by-case basis, bearing in mind the particular circumstances.

2. It is important that ships accepted by the Administration under the provisions of subparagraph .1 above are also to be accepted as such by port States. In order to ensure this, the following practice is recommended to Administrations when considering an application for such a ship:

1. the Administration should thoroughly consider applications on a case-by-case basis, bearing in mind the particular circumstances. In doing so in the case of a ship converted in a foreign country, the Administration may require a formal report from the authorities of the country in which the ship was converted, stating that the delay was due to unforeseen circumstances beyond the control of the builder and the owner;

2. when a ship is accepted by the Administration under the provisions of subparagraph .1 above, information on the conversion date annotated on the relevant certificates is to be footnoted to indicate that the ship is accepted by the Administration under the unforeseen delay in completion of the conversion provisions of this interpretation; and

3. the Administration should report to the Organization on the identity of the ship and the grounds on which the ship has been accepted under the unforeseen delay in the completion of the conversion provisions of this interpretation.

For conversions of single-hull oil tankers to double-hull oil tankers or bulk carriers, the following is to apply:

1. Conversions of single-hull oil tankers to double-hull oil tankers or bulk carriers is to be regarded as modifications of a major character for the purposes of SOLAS Ch. II-1.

2. Repairs, alterations and modifications of a major character include:

1. Substantial alteration of the dimensions of a ship, for example lengthening of a ship by adding a new midbody. The new midbody is to comply with SOLAS Ch. II-1.

2. A change of ship type, for example an oil tanker converted to a bulk carrier. Any structure, machinery and systems that are added or modified is to comply with SOLAS Ch. II-1, taking into account the interpretation of SOLAS Ch. II-1 regulations as contained herein.

1.1.31.2 Protective coatings of dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers SOLAS Ch. II-1 Reg. 3-2, 2 and Reg. 3-2, 4 (as amended by MSC.216(82))

SOLAS Ch. II-1, Reg. 3-2:

“2 All dedicated seawall ballast tanks arranged in ships and double-side skin spaces arranged in bulk carriers of 150 m in length and upwards shall be coated during construction in accordance with the Performance standard for protective coatings for dedicated seawall ballast tanks in all types of ships and double-side skin spaces of bulk carriers, adopted by the Maritime Safety Committee by resolution MSC.215(82), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the Annex other than chapter I.”

Interpretation

1. For single-hull oil tanker conversion into double-hull oil tanker, SOLAS Regulation II-1/3-2 as adopted by resolution MSC.216(82) is to apply to dedicated water ballast tanks if constructed with all structural members being entirely new. If converting existing spaces into water ballast tanks with part of the existing structural members remaining in place, revised SOLAS Regulation II-1/3-2 (MSC.216(82)) need not be applied. However, dedicated sea water ballast tanks are to have an efficient corrosion prevention system such as hard protective coatings or equivalent and be of light colour.

2. For single-hull oil tanker conversion into bulk carrier, SOLAS Regulation II-1/3-2 as adopted by resolution MSC.216(82) is to apply to dedicated water ballast tanks and double-side skin spaces of bulk carriers if constructed with all structural members being entirely new. If converting existing spaces into dedicated water ballast tanks or double-side skin space of bulk carriers with part of the existing structural members remaining in place, revised SOLAS Regulation II-1/3-2 (MSC.216(82)) need not be applied. However, dedicated sea water ballast tanks are to have an efficient corrosion prevention system such as hard protective coatings or equivalent and be of light colour.
1.1.31.3 Access to and within spaces in, and forward of, the cargo area of oil tankers and bulk carriers SOLAS Ch. II-1 Reg. 3-6 (as amended by MSC.194(80))

Interpretation

1. For single-hull oil tanker conversion into double-hull oil tanker

1.1 Permanent means of access contained in table 1 of the Technical provisions for means of access for inspections (resolution MSC.158(78)) need not apply. However, if, in the course of conversion, substantial new structures are added, these new structures are to comply with the regulation.

1.2 The term "substantial new structures" means hull structures that are entirely renewed or augmented by new double bottom and/or double-side construction (e.g., replacing the entire structure within cargo area or adding a new double bottom and/or double-side section to the existing cargo area).

1.3 Additionally, an approved Ship Structure Access Manual is to be provided.

2. For single-hull oil tanker conversion into bulk carrier

2.1 Permanent means of access contained in table 2 of the Technical provisions for means of access for inspections (resolution MSC.158(78)) need not apply. However, if, in the course of conversion, substantial new structures are added, these new structures are to comply with the regulation.

2.2 The term "substantial new structures" means hull structures that are entirely renewed or augmented by new double bottom and/or double-side skin construction (e.g., replacing the entire structure within cargo area or adding a new double bottom and/or double-side section to the existing cargo area).

2.3 Additionally, an approved Ship Structure Access Manual is to be provided.

1.1.31.4 Towing and Mooring Equipment SOLAS Ch. II-1 Reg. 3-8 (as amended by MSC.194(80))

Interpretation

For single-hull oil tanker conversion into double-hull oil tanker or bulk carrier

This regulation is to be applied when equipment and fittings for mooring/towing are replaced, modified or the safe working load of the existing equipment and fittings is known. Where the latter cannot be ascertained, alternative compliance with SOLAS Regulation II-1/3-8 is to be sought (e.g., the equipment is to be replaced, tested or modified).

1.1.31.5 Subdivision and stability SOLAS Ch. II-1 Part B and Part B-1 (as amended by MSC.216(82))

Interpretation

1. For single-hull oil tanker conversion into double-hull oil tanker

Oil tankers complying with damage stability requirements contained in Annex I to MARPOL 73/78 (except for combination carriers with type B freeboards) may be excluded from the damage stability requirements contained in SOLAS Ch. II-1, part B-1.

2. For single-hull oil tanker conversion into bulk carrier

2.1 A bulk carrier which is assigned a B reduced freeboard complying with damage stability requirements contained in regulation 27 of the 1966 Load Line Convention, and resolutions A.320(X) and A.514(13); or regulation 27 of the 1988 Load Line Protocol, may be excluded from the damage stability requirements contained in SOLAS Ch. II-1, part B-1.

2.2 For a bulk carrier which is assigned a B freeboard, SOLAS Ch. II-1, Parts B and B-1 are to be applied.

1.1.31.6 Repairs, alterations, modifications and outfitting SOLAS Ch. II-2 Reg. 1.3 SOLAS Ch. II-2, Reg. 1.3

‘Repairs, alterations, modifications and outfitting’:

3.1 All ships which undergo repairs, alterations, modifications and outfitting related thereto shall continue to comply with at least the requirements previously applicable to these ships. Such ships, if constructed before 1 July 2002, shall, as a rule, comply with the requirements for ships constructed on or after that date to at least the same extent as they did before undergoing such repairs, alterations, modifications or outfitting.

3.2 Repairs, alterations and modifications which substantially alter the dimensions of a ship or the passenger accommodation spaces, or substantially increase a ship’s service life and outfitting related thereto shall meet the requirements for ships constructed on or after 1 July 2002 in so far as the Administration deems reasonable and practicable.

Interpretation

For single-hull oil tanker conversion into double-hull oil tanker or bulk carrier, new and converted parts are to comply with the latest applicable requirements.

1.1.31.7 Alterations and modifications of a major character SOLAS Ch. III Reg. 1.4.2

SOLAS Ch. III, Reg. 1 ‘Application’:

4 For ships constructed before 1 July 1998, the Administration shall:

1 ……... and

2 ensure that when life-saving appliances or arrangements on such ships are replaced or such ships undergo repairs, alterations or modifications of a major character which involve replacement of, or any addition to, their existing lifesaving appliances or arrangements, such life-saving appliances or arrangements, in so far as is reasonable and practicable, comply with the requirements of this chapter. However, if a survival craft other than an inflatable lifeboat is replaced without replacing its launching appliance, or vice versa, the survival craft or launching appliance may be of the same type as that replaced.”
Interpretation

For single-hull oil tanker conversion into double-hull oil tanker or bulk carrier, this to be considered as an alteration or modification of a major character.

### 1.1.31.8 Survival craft and rescue boats SOLAS Ch. III Reg. 31.1.8

**SOLAS Ch. III, Reg. 31 ‘Survival craft and rescue boats’**:

“1.2 In lieu of meeting the requirements of paragraph 1.1, cargo ships may carry:

1. one or more free-fall lifeboats, complying with the requirements of section 4.7 of the Code, capable of being free-fall launched over the stern of the ship of such aggregate capacity as will accommodate the total number of persons on board; and

2. in addition, one or more inflatable or rigid liferafts complying with the requirements of section 4.2 or 4.3 of the Code, on each side of the ship, of such aggregate capacity as will accommodate the total number of persons on board. The liferafts on at least one side of the ship shall be served by launching appliances.”

and

“1.8 Notwithstanding the requirements of paragraph 1.1, bulk carriers as defined in regulation IX/1.6 constructed on or after 1 July 2006 shall comply with the requirements of paragraph 1.2.”

Interpretation

1. For single-hull oil tanker conversion into double-hull oil tanker, this regulation is not relevant.

2. For single-hull oil tanker conversion into bulk carrier, SOLAS Regulation III/31.1.8 is to be met as for new ships, except where the space available for fitting and/or launching a free-fall lifeboat in accordance with regulation III/31.1.2.1 is not adequate, in which case the Administration is to be contacted to determine whether or not existing arrangement may be accepted.

### 1.1.31.9 Navigation bridge visibility SOLAS Ch. V Reg. 22

Interpretation

For single-hull oil tanker conversion into double-hull oil tanker or bulk carrier, the level of visibility possessed by the ship prior to the conversion at the ballast loading condition is to be maintained after the conversion. Where a conversion involves the modification of structural arrangements used to establish minimum bridge visibility, the provision of SOLAS Regulation V/22 is to apply.

### 1.1.31.10 Damage stability requirements applicable to bulk carriers SOLAS Regulation XII/4.1, structural strength of bulk carriers SOLAS Regulation XII/5.1 and 5.2, structural and other requirements for bulk carriers SOLAS Regulation XII/6.1, XII/6.2, XII/6.3 (MSC.216(82) Annex 1) and XII/6.4 (MSC.216(82) Annex 1), survey and maintenance of bulk carriers SOLAS Regulation XII/7.1 and XII/7.2, information on compliance with requirements for bulk carriers SOLAS Regulation XII/8, requirements for bulk carriers not being capable of complying with regulation 4.3 due to the design configuration of their cargo holds SOLAS Regulation XII/9, Solid bulk cargo density declaration SOLAS Regulation XII/10, Loading instrument SOLAS Regulation XII/11, Hold, ballast and dry space water ingress alarms SOLAS Regulation XII/12, Availability of pumping systems SOLAS Regulation XII/13, Restrictions from sailing with any hold empty SOLAS Regulation XII/14

Interpretation

1. For single-hull oil tanker conversion into double-hull oil tanker, these regulations are not relevant.

2. For single-hull oil tanker conversion into bulk carrier, the provisions of chapter XII applicable for ships constructed on or after the date on which conversion occurs, are to be applied as for a new ship to the entire bulk carrier, i.e. all new and existing parts and spaces, as indicated in the table below.

### 1.1.31.11 Table of application of the Regulations of SOLAS Ch. XII to the conversions of Single Hull Tankers to Bulk Carriers/Ore Carriers

<table>
<thead>
<tr>
<th>Reg.</th>
<th>Applicability</th>
<th>Note</th>
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<tbody>
<tr>
<td>4.1</td>
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<tr>
<td>4.2</td>
<td>Applicable, based on the Unified interpretations of SOLAS regulations XII/4.2 and XII/5.2 (MSC.1/Circ.1178).</td>
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<tr>
<td>4.3</td>
<td>Not applicable</td>
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<tr>
<td>4.4</td>
<td>Not applicable</td>
<td>This regulation is referred to within regulations 4.1 and 4.2</td>
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<tr>
<td>4.5</td>
<td>Not applicable</td>
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<td>4.6</td>
<td>Applicable</td>
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<td>4.7</td>
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<td>5.1</td>
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<td>5.2</td>
<td>Applicable, based on the Unified interpretations of SOLAS regulations XII/4.2 and XII/5.2 (MSC.1/Circ.1178).</td>
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<tr>
<td>6.1</td>
<td>Not applicable</td>
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<td>6.2</td>
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<td>6.4</td>
<td>Applicable</td>
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1.2 TECHNICAL DOCUMENTATION

Below given list provides general definitions of technical documentation categories and types based on the understanding of the Register. Specific requirements for documentation submission may be additionally agreed for particular project.

1.2.1 General documentation (OD):
- Outline specification of a ship.
- General arrangement.
- Capacity plan.
- Plan of ship’s lines (including offset table).
- Docking plan.

1.2.2 Hull (TR):
- Midship section, including typical sections and general specifications.
- Longitudinal section.
- Shell expansion.
- Decks.
- Cargo hatchways.
- Double bottom.
- Watertight/oiltight bulkheads.
- Pillars and girders.
- Structural strengthening.
- Ship’s end structures with posts.
- Propeller shaft struts and bossings.
- Engine and thrust bearing seatings.
- Superstructures and deckhouses.
- Side, bow and stern doors.
- Arrangements on bottom plating for inwater survey (if IWS class notation is requested).

1.2.3 Arrangement of permanent and movable means of access to structure to enable close-up examination of the structure in a safe and practical way (only for ships comprising the requirements from SOLAS 74, Reg. II-1/3-6, as amended with IMO Res. MSC.151(78)). Requirements of IACS UI SC191 (Application of amended SOLAS Reg. II-1/3-6 (Res. MSC.151(78))) and revised Technical provisions for means of access for inspections (Res. MSC.158(78)) should be taken into account also.

1.2.4 Coating Technical File, for ships subject to compliance with the IMO Performance Standard for Protective Coatings (PSPC) as a class requirement under the IACS Common Structural Rules.
NOTE: Oil tankers of 150 meters in length and above and bulk carriers of 150 meters in length and above, constructed with single deck, top-side tanks and hopper side tanks in cargo spaces, excluding ore carriers and combination carriers and for which:
- building contract has been placed on or after 1st July 2016;
- in the absence of building contract, the keels of which are laid, or which are at similar stage of construction on or after 1st July 2017; or
- the delivery of which is on or after 1st July 2020;
are to comply with IMO standard "Goal-based ship construction standard for bulk carriers and oil tankers (GBS)". Also, with the amendments of SOLAS (MSC.290(87)), new Chapter II-1, Reg. 3-10 has been added making compliance with GBS requirements mandatory.

As a part of this Regulation requirement for keeping Ship Construction File (SCF) on board and ashore has become mandatory also.

For the information to be included in the Ship Construction File refer to IMO MSC.1/Circ.1343. The Ship Construction File is to be updated whenever any modification of the documentation included occurs. The Ship Construction File should be available to the Register and to the Flag State throughout ship's life, while during regular Annual, Intermediate and Renewal surveys management conditions of the plans and documents contained therein should be verified by the Register.

### 1.2.3 Hull equipment (OT):

1. Calculation of equipment number.
2. Steering gear system (including rudder, stock, tiller, bearings and nozzle).
3. Anchoring and mooring handling arrangements.
4. Towing gear, including emergency towing gear (for oil and chemical tankers with not less than 20,000 tons deadweight, according to SOLAS, Reg. II-1/3-4).
5. Signal masts.
6. Openings and closing arrangements for shell, decks and bulkheads (scuttles, watertight doors, hold and tank hatch covers).
7. Scheme of means to different compartments, decks, etc., with indicated emergency exits and escape ways.

### 1.2.4 Stability (PL):

1. Inclining test report.
3. Damage stability calculation (if SD class notation is requested).

### 1.2.5 Machinery installation (ST):

1. General arrangement of engines, boilers and installations in machinery spaces, including specification.
2. Plan of seatings and arrangements of holding down bolts for boilers, engines, thrust block, pressure vessels, generators and other important auxiliary engines.
4. Shafting alignment calculation.
5. Plan of sternpost tubes with details.
6. Plan of shafts (propeller shaft, intermediate shaft, thrust shaft).
7. Plan of shaft coupling.
8. Plan of supporting and thrust bearing.
9. Calculation of shaft and couplings.
10. Calculation of loading and shaft bearing (not subject to approval).

.11 Calculation of pulling in of the ship's propeller and coupling.
.12 Propeller plans (not subject to approval).
.13 Torsional vibration calculations for the dynamic systems formed by internal combustion engines, generators and auxiliary engines (of power exceeding 1500 [kW]), flexible couplings, gearing, shafting and propeller where applicable including all branches. For turbine and electric drives the Register will specially consider the necessity of calculation submission in each particular case.
.14 General plan of shaft lines.
.15 Propeller blade calculation and attachment of blade to the propeller boss.
.16 Controllable pitch propeller main element plan (hydraulic cylinder, rod, piston, guide, etc.) and scheme of governing piping.
.17 Drawing of special type propelling machinery (nozzle propellers, side thruster, etc.).
.18 Documentation for assignment of IGS additional character of class:
   - schematic diagram of inert gas system, including water supply and discharge piping;
   and as applicable plans for:
   - inert gas generating plant;
   - sectional view through gas cooling and cleaning device;
   - sectional view through non-return valves;
   - sectional view through pressure-vacuum breaking device;
   - piping arrangement for inert gas distribution and tank ventilation;
   - documentation related to instrumentation and automation (including computer based control and monitoring);
   - instruction manual (covering operational safety requirements and guidelines to be followed in the event of failure of inert gas system).
.19 Documentation for assignment of COW additional character of class:
   - schematic diagram of crude oil washing system, including dimensions and materials;
   - schematic diagram of the stripping and drainage arrangement;
   - shadow diagrams showing the tank areas covered by direct impingement from the washing machines (not required for tanks or cargo holds without internal structure);
   - documentation showing number, location, make and type of washing machines with nozzle diameters;
- drawings showing installation and supporting arrangement for the washing machines;
- drawings showing the anchoring of piping for crude oil washing;
- drawings showing exact position and arrangement of dipping and gas sampling locations;
- operation and equipment manual;
- documentation related to instrumentation and automation (including computer based control and monitoring).

### 1.2.6 Piping (ST):

.1 Bilge ballast system.
.2 Ballast system.
.3 Scheme of piping for heel and trim leveling.
.4 Scheme of cargo piping, stripping piping and installations for gas freeing of cargo tanks.
.5 Scheme of sounding pipes, vents and overflow pipes.
.6 Exhaust gas system.
.7 Ventilation system in machinery spaces and cargo holds.
.8 Oil fuel piping system.
.9 Lubricating oil system.
.10 Engine cooling (fresh and sea-water) system.
.11 Compressed air system.
.12 Feed water and condensate system.
.13 Steam piping system.
.14 Scheme of blowing off boiler piping and other installations.
.15 Hydraulic and pneumatic control piping system.
.16 Fresh and drinking water piping system.
.17 Sanitary piping and discharge system.
.18 Ship side valves and fittings (suction and discharge valves or cocks, blow-down valves or cocks and gratings).
.19 Scheme of remote control on quick-closing valves.
.20 Waste water treatment system.
.21 Crude oil washing system (equipment, piping, fittings).
.22 Arrangement of inert gas piping system together with details of inert gas generating plant including all control and monitoring devices.

### 1.2.8 Electrical equipment (EL):

.1 General arrangement plan of major electrical equipment (main and emergency generators, main and emergency switchboards, emergency service motors and batteries).
.2 Generators - type of prime movers, rated power ([kVA] and [kW]), transient and sub-transient reactance (for total power of all generators greater than 500 [kW] and for generators powered by the main propulsion system e.g. shaft generators, construction details including fittings).
.3 Power converters - type, rating [kVA] and voltage (primary/secondary).
.4 General arrangement of electrical equipment and installations in hazardous zones and spaces including details of type and equipment, type of protection, temperature class, certifying authority and certificate number.
.5 Calculation of short circuit currents at main and emergency switchboard (if total power of all generators is greater than 500 [kW]) including symmetrical component and peak value of short circuit current.
.6 Power consumption (load balance) for normal operating loads on the system estimated for the different operating conditions expected (service at sea, in harbour, while manoeuvring, emergency situations, etc.).
.7 Single line diagram of all power distribution boards, which is to include:
   a) arrangement and rating of consumers,
   b) connected load ([kW] or [A]),
   c) type and size of cables,
   d) make, type and rating of circuit breakers and fuses,
   e) for automatic circuit breakers switch on/breaking power and relay initial setting value.
.8 For main and emergency switchboards and large motor control centers (MCC equal or greater than 100 [kW]) the following particulars are to be submitted:
   a) arrangement drawings with panel front view,
   b) diagrams of all control circuits, type and size of cables and make, type, size for all equipment,
   c) bus-bars details including cross section and insulation material of bus-bars support,
   d) make, type, rating of fuse and switchgear including breaking/making capacity for all circuit breakers used,
   e) fuse and switchgear release characteristics with regard to the selective action of the protective devices,
   f) calculation of mechanical stress on bus-bars due to short circuit current, if the calculated short circuit current is greater than 50 [kA] (r.m.s.).

.9 Schematic diagrams of following systems and equipment:
   a) starters for essential motors,
   b) starters for thrusters,
   c) static converters (SCR-units) for essential equipment.

.10 Documentation of distribution board for refrigerating equipment.

.11 General arrangement of main cable track.

.12 Main lighting - cable diagram.

.13 Emergency lighting - cable diagram.

.14 Documentation of electrical propulsion system (if fitted).

.15 Signal and navigation lights - cable diagram.

.16 Internal communication and signalling system.

.17 Fire detection and alarm system.

.18 Diagram of cable routes.

.19 For passenger ships - general arrangement plan of the ship showing the vertical fire zones and location of equipment and cable routes of:
   a) emergency lighting,
   b) fire detection, alarm and extinction system,
   c) public address system,
   d) general alarm,
   e) watertight doors,
   f) system for emergency stop of fuel oil pumps and fans.

.20 Location and technical characteristics of batteries.

1.2.9 Automation (EL):
   .1 List of systems (control, alarm, safety) including component maker and type.
   .2 List of monitored, control and alarm points.
   .3 Arrangement scheme of systems and components.

1.2.10 Fire protection (PZ):
   .1 General arrangement plan showing the main fire zones, escape stairways and the fire compartmentation bulkheads and decks within the main fire zones, including details of construction of the fire protection bulkheads, decks, fire doors and the particulars of any surface laminates employed.

   .2 General arrangement plan showing disposition of all the fire fighting equipment including the fire main, the fixed fire extinguishing systems in the cargo holds, on deck and in the machinery spaces, the disposition of the portable and non-portable extinguishers and the types used and the position and details of the firemen's outfits.

   .3 Plan showing the layout and construction of the fire main, including the main and emergency fire pumps, isolating valves, pipe sizes and materials, the international shore connections and the cross connections to any other system.

   .4 Plan showing details of each fixed fire fighting system, including calculations for the quantities of the media used and the proposed rates of application.
1.2.11 Carriage of chemicals:
For additional documentation see the Rules, Part 27 - Chemical tankers.

1.2.12 Floating docks:
The following documentation for docks of caisson type, as well for docks of the pontoon type should be submitted:
.1 General arrangement plan, showing the arrangement of compartments and tanks.
.2 Drawings of longitudinal and transverse sections, showing all scantlings and the position of longitudinal and transverse girders, and of watertight bulkheads.
.3 Drawings of the wing walls with top deck and safety deck, bottom caisson or non-contiguous pontoons.
.4 Drawings of the structural elements of pontoon decks which transfer the forces pontoon - wing wall-pontoon in way of the pontoon gaps.
.5 Admissible loads and deflections according to the dock Operating Instructions.
.6 Pumping diagram showing the differences in pressure between the inside water and the outside water over the total docking procedure.
.7 Strength calculations for the various longitudinal and transverse load conditions as well as proof of local strength.
.8 Plans of machinery and electrical installations.
.9 Plans of piping systems and of fire protection and extinguishing appliances.
.10 Calculations showing the stability of the dock when supporting a ship.

1.2.13 Documentation for assignment of FIR additional character of class:
.1 Schematic diagram of the fixed self-protection water spraying system.
.2 Structural fire protection plan of exterior boundaries of the ship.
.3 Schematic diagram of water fire extinguishing system for fighting of external fires.

In the case of ships equipped with foam fire extinguishing system for fighting external fires, in addition to above stated the following is to be submitted, also, but only in the case of fitting of fixed low expansion foam fire extinguishing system.

1.2.14 Documentation for assignment of PC xx additional character of class refer to the Rules, Part 29 – Polar Class Ships and Ice Class Ships.

1.2.15 Documentation for assignment of PMON additional character of class refer to the Rules, Part 7 – Machinery installation.

1.2.16 Documentation for assignment of PW-CA additional character of class:
.1 Arrangement, design and equipment specification for accommodation spaces (general design, sleeping accommodation, sanitary spaces, public spaces, mess rooms, sanitary spaces, domestic spaces, medical spaces).
.2 General arrangement of fixed and removable rails, handrails and life lines including specification and design details.
.3 General arrangement of stairways, platforms and ladders including specification and design details.
.4 Disposition of ladders and gangways.
.5 Thermal and acoustic insulation plan (including calculations and design details).
.6 General arrangement of ventilation, air conditioning and heating (including calculations and design details).
.7 Illumination (lighting) level (design details and testing results).
.8 Noise prevention (design details and testing results).
.9 Vibration prevention (design details and testing results).

1.3 SURVEY DURING CONSTRUCTION OF HULL, BUILDING IN OF MACHINERY, INSTALLATIONS AND EQUIPMENT

1.3.1 This survey shall verify:
.1 That the construction and scantlings of the ship complies with the requirements of the Rules and approved plans and that the required materials are used.
.2 That the materials, components and equipment, intended for the installation on the ship, have been supervised during construction in accordance with the Rules, and that they have appropriate certificates.
.3 That satisfactory functional testing has been carried out to the extent and in the manner prescribed by the approved Testing Program and the requirements of the Rules.
.4 That the work carried out (including fabrication tolerances) is in compliance with the applicable Rules, standards and good shipbuilding practice. IACS Recommend-
tion No. 47 - "Shipbuilding and Repair Quality Standard", SARQS should be taken as an example of an acceptable standard.

5. That the Class Certificate, record books, operating manuals and other instructions and documentation specified in the Rules, relevant to the Class Certificate, have been placed on board the ship.

1.3.2 If subsequent information gives objective evidence that the works performed are not in compliance with requirements stated in 1.3.1, the Register reserves the right to revoke survey during construction.

1.4 REQUIREMENTS FOR TESTING DURING CONSTRUCTION

1.4.1 Testing procedures of watertight compartments

1.4.1.1 Procedures for tank testing and testing of boundaries are to confirm the watertightness of tanks and watertight boundaries, the structural adequacy of tanks and weathertightness of structure / shipboard outfitting. Subject testing should be performed on:

1. New ships prior delivery, and
2. Structure involved in, or affected by, major conversions or repairs (repair affecting structural integrity) on existing ships.

1.4.1.2 For detailed requirements on the application and testing procedures refer to the Rules, Part 2 - Hull, 11.6, 11.7 and 11.8, or IACS UR S14, Rev.6 - "Testing procedures of watertight compartments", depending on the type of the ship:

1. SOLAS ships (including CSR Bulk carriers and CSR Tankers);
2. Non-SOLAS ships, ships exempted from SOLAS, Ch. II-1, Reg. 11 and ships performing testing deemed equivalent to the requirements of SOLAS, Ch. II-1, Reg. 11 by the Flag State Administration.

1.4.2 Anchor windlass testing

1.4.2.1 Each anchor windlass is to be tested under normal working conditions to demonstrate satisfactory operation.

Each required anchor handling unit is to be tested for braking, clutch functioning, power lowering, hoisting, and proper riding of the chain through hawse pipe, over the chain wheel, through the chain pipe, and stowing in the chain locker. Also, it is to be demonstrated that the windlass is capable of lifting each anchor with 55 meters (2 lengths) length of chain, starting from the moment when 82.5 meters (3 lengths) length of chain is submerged and hanging free (minimal winding up velocity is not to be less than 9 [m/min]). If the available water depth is insufficient, the proposed test method will be specially considered.

1.4.3 Testing of machinery installation

1.4.3.1 Requirements for testing during construction related to machinery installations are stated in the Rules, Part 9 - Machines and Part 7 - Machinery Installation.

1.4.4 Testing of steering arrangements

1.4.4.1 Requirements for survey during manufacture and testing including sea trials testing are stated in the Rules, Part 9 - Machines.

1.4.5 Testing of boilers, heat exchangers and pressure vessels

1.4.5.1 Requirements for testing during construction related to boilers, heat exchangers and pressure vessels are stated in the Rules, Part 10 - Boilers, Heat Exchangers and Pressure Vessels.

1.4.6 Testing of piping

1.4.6.1 Requirements for testing during construction related to piping are stated in the Rules, Part 8 - Piping.

1.4.7 Testing of welded joints

1.4.7.1 Requirements for testing of welded joints are stated in the Rules, Part 26 - Welding.

1.4.8 Metallic materials

1.4.8.1 Requirements for materials and their testing are stated in the Rules, Part 25 - Metallic Materials.

1.4.9 Non-metallic materials

1.4.9.1 Requirements for non-materials and their testing are stated in the Rules, Part 24 - Non-metallic Materials.
2 INITIAL CLASS ENTRY SURVEY OF EXISTING SHIPS - ADMISSION TO CLASS

2.1 GENERAL

2.1.1 This Section of this Chapter of the Rules is applicable to all existing ships or floating units of whatever type, age or navigation area, self-propelled or not, not being built under supervision of the Register, irrespective of their size or navigation area, to be admitted to Register class for the first time.

For that purpose the Register is to perform Initial class entry survey in order to verify whether the ship is eligible to be classed on the basis of the Rules.

2.1.2 Initial class entry survey is a complete inspection of a ship before it is put into service, comprising inspection of all the items relating to the Certificate of class to ensure that the relevant requirements are complied with, and that these items are satisfactory for the service and navigation area for which the ship is intended.

2.1.3 Initial class entry survey should consist of:

.1 An examination of the ship’s particulars related to the structure, machinery and equipment installed on the ship to verify compliance with the requirements of the Rules, relevant to the Certificate of class.

.2 An inspection of the structure, machinery and equipment to ensure that they have been properly maintained and in satisfactory condition and are fit for the service for which the ship is intended, and that there have been no unauthorised changes.

.3 A check that the Certificate of class, record books, operating manuals and other instructions and the documentation specified in the requirements of the Rules, relevant to the Certificate of class have been placed on board the ship.

2.1.4 Request for the classification of the ship not constructed under the survey of the Register is to be addressed to Head Office of the Register in writing. It is to be accompanied with the ship particulars and information on the previous class status and period, as well as about any conditions of class (recommendations) imposed by the previous (current) classification society.

2.1.5 When the Owner (or the Company) applies to the Register for admission to class, the application will be processed depending on whether the ship is:

.1 Classed with the recognized classification society (IACS member class society), or

.2 Not classed with the recognized classification society.

2.1.6 As a rule, ships not constructed under the survey or not being classed by the recognised classification society will not be admitted for classification if their hull consists of fibre-reinforced plastics. Notwithstanding before stated, in exceptional cases and for ships not to be engaged on international voyages the Register may accept admission to class of such ships providing they comply with the requirements of the Rules for technical supervision of ships made of wood, aluminium alloys and reinforced plastics.

2.2 SHIPS NOT CLASSED WITH THE RECOGNIZED CLASSIFICATION SOCIETY

Surveys

2.2.1 In the case of existing ships not being classed with the recognised classification society of whatever type, age or navigation area, self-propelled or not and having GT > 100 Initial class entry survey is to be carried out as follows:

.1 Renewal survey of hull, including thickness measurement.

.2 Renewal survey of machinery installation.

.3 Dry-docking survey.

.4 Tailshaft survey(s).

.5 Boiler survey(s) and survey(s) of pressure vessels.

Further examinations, tests and measurements, including, but not limited to material testing, non-destructive testing, hydraulic and hydrostatic tests and sea-trials may be also considered by the Register.

However, in cases where the ship, during any portion of the five year period prior to the request for the classification being received, has been classed by the recognized classification society then survey requirements may be specially considered but are not to be less than those required by IACS PRID.

2.2.2 Additionally to 2.2.1 the survey is to be carried onboard for assessment of compliance with the submitted drawings, including trials and/or functional testing when and if deemed necessary. All surveys which are to be carried out, are to include workmanship, material and scantling survey.

Dispensation to the scope of surveys to be carried out on board ship for the purpose of assessment of compliance of the ship with submitted drawings and workmanship, material and scantling survey, may be given to ships classed with a society being a Recognized Organization according to EU Regulation 391/2009 and EC Directive 2009/15/EC and in the cases when the ship has been previously classed with the recognised classification society.

2.2.3 Where appropriate within reasonable limits, for ships having GT ≤ 100 and not engaged in international voyages, a proven service record of satisfactory performance during a period of adequate length may be used as a criterion of equivalence (as a rule this period of adequate length should in no case be less than five years). Special consideration will be given to ships of recent construction.

Documentation

2.2.4 As a rule, the following drawings and particulars are to be submitted to the Register, in order to be checked for compliance with applicable Rules of the Register:
.1 Documentation related to hull:
Main plans
a) general arrangement,
b) capacity plan,
c) hydrostatic curves,
d) loading manual, where required,
e) documentation related to stability (trim and stability book and damage stability calculation, if applicable).
Steel plans
f) midship section,
g) ship's body lines with offset tables,
h) scantling plan,
i) decks,
j) shell expansion,
k) transverse bulkheads,
l) rudder and rudder stock,
m) hatch covers,
n) stern frame.

.2 Documentation related to machinery:
a) machinery arrangement,
b) intermediate, thrust and screw shafts,
c) propeller,
d) main engines, propulsion gears and clutch systems (or manufacturer make, model and rating information),
e) for steam turbine vessels, main boilers, superheaters and economisers (or manufacturer make, model and rating information) and steam piping,
f) bilge and ballast piping diagram,
g) steering gear systems piping and arrangements and steering gear manufacturer make and model information.

.3 Torsional vibration calculations:
a) for ships less than 2 (two) years old torsional vibration calculations are to be submitted.

.4 Additional documentation for ships with ice class notation:
a) plans for flexible couplings and/or torque limiting shafting devices in the propulsion line shafting (or manufacturer make, model and rating information).

.5 Additional documentation for oil tankers:
a) pumping arrangement at the forward and after ends and drainage of cofferdams and pump rooms.

.6 Additional documentation for ships with unattended machinery space:
a) instrument and alarm list,
b) fire alarm system,
c) list of automatic safety functions (e.g. slowdowns, shutdowns, etc.),
d) function testing plan.

Submittal and reviewing of the documentation by the Register with satisfactory results is considered as a prerequisite for issuing an Interim or full term Certificate of class. However, having made a good faith effort to obtain the information, if it proves not practicable to acquire certain documents, equivalent/alternative technical data should be provided to the Register prior issuing full term Certificate of class.

In cases when the ship has been previously classed with the recognised classification society submission of the documentation may be specially considered subject to confirmation that no alterations / modifications have been made.

Additional information may be necessary according to Flag State requirements.

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

IACS PR1D

2.2.5 The Register reserves the right to ask for additional documentation which considers necessary in each particular case. For installations or equipment covered by specific service and/or class notation, the Register will determine the scope of additional documentation to be submitted.

2.2.6 In addition to 2.2.5 the Register may base its judgement upon documentation such as certificates issued or accepted by the former classification society, if any, and statutory certificates issued by the Flag State Administration, or by a recognized organization on its behalf.

2.2.7 The Register is not to issue an Interim Certificate of class, or other documents enabling the ship to trade under its classification:
.1 Until all required surveys are satisfactorily completed.
.2 Until review of the documentation listed in 2.2.4 has been carried out.
.3 Before giving the opportunity to the Flag State Administration to provide any further instructions within three (3) working days (in compliance with the requirements of Art. 10.5 of the Regulation (EC) No. 391/2009, as amended).

IACS PR1D

2.3 SHIPS CLASSED WITH THE RECOGNIZED CLASSIFICATION SOCIETY

Surveys

2.3.1 For ships classed with the recognized classification society (IACS member class society) and having GT > 100 of whatever type, self-propelled or not, having restricted navigation area or not, when transferring a class, the requirements of IACS Transfer of Class (TOC), according to IACS PR1A "Procedure for transfer of class" will be applied.

2.3.2 According to 2.3.1, and notwithstanding the records indicating that all surveys are up-to-date, the Register is to hold an Initial class entry survey 81), the extent of which is to

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81) Class entry surveys may be, but are not required to be, credited as periodic surveys for maintenance of classification. Conditions of class due for compliance at a specified periodical survey for maintenance of classification need not to be carried out/complied with at a class entry survey, unless class entry survey is credited as the specified periodical survey for maintenance of classification or the condition of class is overdue.
be based on the age of the ship and the losing classification society’s class status.

The Register is not to issue an Interim Certificate of class, or other documents enabling the ship to trade:

1. Until all overdue surveys and all overdue recommendations / conditions of class previously issued against the subject vessel as specified to the Owner by the losing Society, have been completed and rectified by:
   a) the gaining Society, for vessels less than 15 years of age;
   b) the losing Society, for vessels 15 years of age and above; and

2. Until all relevant surveys have been satisfactorily completed. However, when facilities are not available in the first port of survey, an Interim Certificate of Class may be issued to allow the vessel to undertake a direct voyage to a port where facilities are available to complete required surveys.

3. Before giving the opportunity to the Flag State Administration to provide any further instructions within three (3) working days (in compliance with the requirements of Art. 10.5 of the Regulation (EC) No. 391/2009, as amended).

1. Hull class entry survey is to be held in an extent as follows:
   a) For ships of age less than 5 (five) years the survey is to be held at the extent of Annual survey.
   b) For ships between 5 (five) and 10 (ten) years of age the survey is to include an Annual survey and inspection of a representative number of ballast spaces.
   c) For ships of 10 (ten) years of age and above, but less than 20 (twenty) years of age, the survey will include an Annual survey and inspection of a representative number of ballast spaces and cargo spaces, except for:
      For gas carriers, in lieu of internal inspection of cargo spaces, the following applies 7):
      - inspection of surrounding ballast tank(s) and void spaces, including external inspection of independent cargo tank(s) and associated supporting systems as far as possible,
      - review of cargo log books and operational records to verify the correct functioning of the cargo containment system.
      For chemical carriers of 10 years of age and above but less than 15 years of age, in lieu of an internal inspection of cargo tanks without internal stiffening and framing, inspections of surrounding ballast tank(s) and void spaces and deck structure, are to be applied.
   d) For ships with affixed ESP notation, (vessels subjected to IACS UR Z10.1, Z10.2, Z10.3, Z10.4 or Z10.5) which are 15 (fifteen) years of age but less than 20 (twenty) years of age, a full Renewal or Intermediate survey is to be carried out, whichever is due next.
   e) For all ships, which are 20 (twenty) years of age and above, a full Renewal survey is to be carried out 8).
   f) In lieu of the requirements in items a) through e), the following apply for site specific purpose built floating and/or storage vessels:
      - for vessels of age less than 5 years, the survey is to have the scope of an Annual survey,
      - for vessels of age between 5 and 10 years, the survey is to include an Annual survey and inspection of twenty percent of ballast spaces,
      - for vessels of age between 10 and 20 years, the survey is to include an Annual survey and inspection of twenty percent of ballast spaces and twenty percent of cargo spaces,
      - for vessels over 20 years of age, the survey is to have the scope of a Renewal survey.
   g) For site specific floating production or storage vessels which have been converted from other vessels, the survey is to take the form of an Annual survey and also include inspection of twenty percent of ballast spaces and twenty percent of cargo spaces until 20 years have elapsed since conversion. After 20 years the survey is to have the scope of renewal survey.
   h) In the context of applying of 2.3.2.1 d) and 2.3.2.1 e), if a dry docking survey is not due at the time of transfer, consideration can be given to carrying out an underwater examination in lieu of dry docking.
   i) in the context of applying items e) and f), as applicable, the anchors and anchor chain cables ranging and gauging for vessels over 15 years of age is not required to be carried out as part of the class entry survey unless the class entry survey is being credited as a periodical survey for maintenance of class. If the class entry survey is to be credited as a periodical survey for mainte-

7) Informative reference only, as the Register does not provide classification for liquefied gas carriers.

8) The requirement under item e) is also applicable to vessels having their hull under continuous survey.
nance of class, consideration may be given by the Register to the acceptance of the anchors and anchor chain cables ranging and gauging carried out by the losing society provided they were carried out within the applicable survey window of the periodical survey in question.

j) In the context of applying items 2.3.2.1 a) to 2.3.2.1 h), as applicable:
- If the class entry survey is to be credited as a periodical survey for maintenance of class consideration may be given by the Register to the acceptance of thickness measurements taken by the losing society provided they were carried out within the applicable survey window of the periodical survey in question.
- If the class entry survey is not to be credited as a periodical survey for maintenance of class, consideration may be given by the Register to the acceptance of thickness measurements taken by the losing society provided they were carried out within 15 months prior to completion of class entry survey when it is in the scope of a Renewal survey, or within 18 months prior to completion of class entry survey when it is in the scope of an Intermediate Survey.

In both cases, the thickness measurements are to be reviewed by the Register for compliance with the applicable survey requirements, and confirmatory gauging are to be taken to the satisfaction of the Register.

k) In the context of applying 2.3.2.1 c) to 2.3.2.1 h), as applicable, tank testing for vessels over 15 years of age is not required to be carried out as part of the class entry survey unless the class entry survey is being credited as a periodical survey for maintenance of class.

If the class entry survey is to be credited as a periodical survey for maintenance of class, consideration may be given by the gaining society to the acceptance of the tank testing carried out by the losing society provided they were carried out within the applicable survey window of the periodical survey in question.

l) In the context of applying 2.3.2.1 a) to 2.3.2.1 h), as applicable, compliance with IACS URs that require compliance at the forth coming due periodical surveys (such as IACS UR S26 and UR S27) are not required to be carried out/completed as part of the class entry survey unless the class entry survey is credited as a periodical survey for maintenance of class.

2. Machinery class entry survey is to be held as a general examination of all essential machinery, and is to include:

a) Examination under working conditions of oil fuel burning equipment, boilers, economisers and steam/steam generators. The adjustment of safety valves of this equipment is to be verified by checking the records on the ship.

b) All pressure vessels.

c) Insulation resistance, generator circuit breakers, preference tripping relays and generator prime mover governors are to be tested and paralleling and load sharing to be proved.

d) In all cases, navigating lights and indicators are to be examined and their working and alternative sources of power verified.

e) Bilge pumps, emergency fire pumps and remote controls for oil valves, oil fuel pumps, lubricating oil pumps and forced draught fans are to be examined under working conditions.

f) Recirculating and ice clearing arrangements, if any.

g) The main and all auxiliary machinery necessary for operation of the ship at sea together with essential controls and steering gear is to be tested under working conditions. Alternative means of steering are to be tested. A short sea trial is to be held at the Surveyors discretion if the ship has been laid up for a long period.

h) Initial start arrangements are to be verified.

i) In the case of oil tankers, the cargo oil system and electrical installation in way of hazardous spaces are to be checked for compliance with the Rules requirements. Where intrinsically safe equipment is installed, the Surveyors are to satisfy themselves that such equipment has been approved by a recognised authority. The safety devices, alarms and essential instruments of the inert gas system are to be verified and the plant generally examined to ensure that it does not constitute a hazard to the ship.

NOTE: For the transfer of class or adding class at ship's delivery items c) and i) may be verified by reviewing ship's record.

2.3.3 For ships with expired or extended certificate of class issued by the recognized classification society, the inspection of the structure, machinery and equipment including tests when necessary, is to be carried out in extent as prescribed for the Renewal survey.
2.3.4 In the case of Initial class entry survey for the purpose of adding dual class to a ship already classed with the recognized classification society, Initial survey having the scope of an Annual survey as a minimum is to be carried out.

2.3.5 For transfer of class at delivery, specific procedure as stipulated by IACS PR1A applies.

2.3.6 In the case of double class arrangement, specific procedure as stipulated by IACS PR1A applies.

Documentation

2.3.7 For ships classed with the recognized classification society and before full term Certificate of class is issued, the Owner is to submit to the Register the following documentation:

1. Documentation related to hull:
   a) Main plans
   b) capacity plan,
   c) hydrostatic curves,
   d) loading manual, where required,
   e) documentation related to stability (trim and stability book and damage stability calculation, if applicable).

Steel plans

f) midship section,

g) ship’s body lines with offset tables,

h) scantling plan,

i) decks,

j) shell expansion,

k) transverse bulkheads,

l) rudder and rudder stock,

m) hatch covers,

n) for CSR vessels. plans showing, for each structural element, both as-built and renewal thicknesses and any thicknesses for “voluntary addition”.

2. Documentation related to machinery:
   a) machinery arrangement,
   b) intermediate, thrust and screw shafts,
   c) propeller,
   d) main engines, propulsion gears and clutch systems (or manufacturer make, model and rating information),

   e) for steam turbine vessels, main boilers, superheaters and economisers (or manufacturer make, model and rating information) and steam piping,

   f) bilge and ballast piping diagram,

   g) steering gear systems piping and arrangements and steering gear manufacturer make and model information.

3. Torsional vibration calculations:
   a) for ships less than 2 (two) years old torsional vibration calculations are to be submitted.

4. Additional documentation for ships with ice class notation:
   a) plans for flexible couplings and/or torque limiting shafting devices in the propulsion line shafting (or manufacturer make, model and rating information).

5. Additional documentation for oil tankers:
   a) pumping arrangement at the forward and after ends and drainage of cofferdams and pump rooms,

   b) general arrangements of cargo piping in tanks and on decks,

   c) plan of hazardous areas.

6. Additional documentation for ships with unattended machinery space:
   a) instrument and alarm list,

   b) fire alarm system,

   c) list of automatic safety functions (e.g. slowdowns, shutdowns, etc.),

   d) function testing plan.

7. Additional documentation required for approval of alternative design and arrangements:
   a) Document(s) of approval of alternative design, if any.

NOTE: Additional information may be necessary according to Flag State requirements.

2.3.8 Alternative technical data may be accepted by the Register in lieu of specific items of the listed documentation not being available at the time of the transfer. IACS PR1A

2.4 SHIPS OF LESS THAN 100 GROSS TONNAGE

2.4.1 For ships of less than 100 gross tonnage, special consideration will be given to the scope of class entry survey and documentation to be supplied.

2.5 DATE OF INITIAL CLASSIFICATION FOR EXISTING SHIPS

2.5.1 Upon completion of Initial class entry survey the assigned period of class is never to exceed 5 (five) years. The five year period is granted only upon satisfactory outcome of class entry survey with the scope of a Renewal survey.

Therefore, as a principle, in the case of existing ships the date of completion of Initial class entry survey is to be considered as a date of initial classification with the Register.

2.5.2 Notwithstanding stated in 2.5.1, if a ship was previously classed with the recognized classification society (IACS member class society), the assigned period of class is never to go beyond the due date of the Renewal survey assigned by the losing society. However, this does not apply to ships with expired or extended certificate of class.

2.5.3 In addition to provisions stated in 2.5.2, and in the case of a ship previously classed with the recognized classification society (IACS member class society), and:

 .1 if the Initial class entry survey has been completed under provisions of IACS PR1A, and

 .2 if such survey has been completed in the scope of Renewal survey, and
.3 if such survey has been completed within 3 months before the Renewal survey expiry date imposed by the losing society, and
.4 if such survey is credited for class Renewal survey,
the next period of class will start from Renewal survey expiry date imposed by the losing society. For surveys completed more than 3 months before Renewal survey expiry date imposed by the losing society, the period of class will start from the completion date of Initial class entry survey.

2.5.4 For ships which were not previously classed with the recognized classification society, the assigned period of class will be counted from the date of completion of Initial class entry survey.
REVIEW OF AMENDMENTS IN RELATION TO PREVIOUS EDITION OF THE RULES

RULES FOR THE CLASSIFICATION OF SHIPS
Part 1 - GENERAL REQUIREMENTS
Chapter 3 – Type approval of products

All major changes in respect to Rules for the classification of ships, Part 1 – General requirements, Chapter 3 – Type approval of products, edition January 2019 throughout the text are shaded (if any).

Items not being indicated as corrected have not been changed.

The grammar and print errors, have been corrected throughout the Rules and are not subject to above indication of changes.
The subject Chapter of this part of the Rules includes the requirements of the following international Organisations:

NO REQUIREMENTS
Chapter 3  TYPE APPROVAL OF PRODUCTS

Contents:

<table>
<thead>
<tr>
<th></th>
<th>GENERAL INFORMATION ...............................................................................................................................</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>TYPE APPROVAL ....................................................................................................................................</td>
<td>2</td>
</tr>
<tr>
<td>2.1</td>
<td>APPROVAL OF THE DOCUMENTATION ........................................................................................................</td>
<td>2</td>
</tr>
<tr>
<td>2.2</td>
<td>TYPE TESTING ......................................................................................................................................</td>
<td>2</td>
</tr>
<tr>
<td>2.3</td>
<td>TYPE APPROVAL CERTIFICATE ...............................................................................................................</td>
<td>2</td>
</tr>
<tr>
<td>2.4</td>
<td>VALIDITY OF THE TYPE APPROVAL CERTIFICATE ....................................................................................</td>
<td>2</td>
</tr>
<tr>
<td>2.5</td>
<td>MAINTENANCE OF VALIDITY OF TYPE APPROVAL ..................................................................................</td>
<td>3</td>
</tr>
<tr>
<td>2.6</td>
<td>SUPERVISION WITH MANUFACTURERS DURING MANUFACTURING OF TYPE APPROVED PRODUCTS ...............</td>
<td>3</td>
</tr>
<tr>
<td>2.7</td>
<td>LIST OF TYPE APPROVED PRODUCTS, APPROVED MANUFACTURERS AND SERVICE SUPPLIERS ..................</td>
<td>3</td>
</tr>
</tbody>
</table>
1 GENERAL INFORMATION

1.1 This Chapter of the Rules for the classification of ships (hereafter referred to as: the Rules) of CROATIAN REGISTER OF SHIPPING (hereafter referred to as: the Register) is prescribing requirements for type approval of products.

Certain machinery, installations, devices, equipment, arrangements and its certain parts, as well as materials (hereafter called: the products) which are subjected to the supervision of the Register, are to be in accordance with the requirements of the Rules and type approved by the Register.

Type approval means an approval process for verifying compliance with the Rules of a product, a group of products or a system, and considered by the Register as a representative of continuous production.

1.2 Type approval of products comprises:

.1 Approval of technical documentation according to the requirements of the Rules and other standards.

.2 Satisfactory completion of the required type tests according to approved testing program.

1.3 Type approval is valid for all the units identical to the prototype subsequently manufactured under the same technology and standards.

1.4 If the product is type approved by an organisation recognised by the Register, the Register may accept the type test results obtained under supervision of such organisation, on condition that technical documentation and type tests results submitted are in accordance with the requirements of the Rules.

1.5 Type approval certificate, when issued, does not exclude requirements for periodical supervision with manufacturers during manufacturing of type approved product.
2 TYPE APPROVAL

2.1 APPROVAL OF THE DOCUMENTATION

2.1.1 For every product intended to be type approved, written application for type approval and following documentation is to be submitted to the Register:

.1 Product identification, with product title, type mark, catalogue number or construction number and manufacturer's title.
.2 Technical description of the product.
.3 Relevant calculations, drawings and operation scheme.
.4 List of materials used, including chemical and mechanical properties.
.5 Field of application.
.6 Boundary work conditions.
.7 Technology and standards applied.
.8 Other particulars as deemed necessary by the manufacturer.

2.2 TYPE TESTING

2.2.1 Type testing comprises one or more tests carried out to give evidence of product conformity with the requirements of the Rules and other standards, and technical description of products.

2.2.2 Product that undergoes testing is to be manufactured according to the approved documentation, materials and technology in compliance with relevant standards. The sample for testing is to be chosen from regular production.

2.2.3 Type testing program according to the relevant requirements of the Rules is to be submitted to the Register.

.1 Characteristics (capacity, power, etc.) and allowable tolerances.
.2 List of tests and duration for each test.
.3 Testing terms.
.4 Particulars for each test, including measurements to be carried out and recorded.
.5 Time and place of testing.

2.2.4 As far as possible tests are to be carried out on the same sample in the presence of the Surveyor or representative of the organisation authorised by the Register.

2.2.5 Testing report is to be signed by the Surveyor, or by the representative of the organisation recognised by the Register present during testing. The manufacturer is to submit to the Register type testing report, which is to comprise as a minimum:

.1 Date of report.
.2 Date when testing has been carried out.
.3 Description and identification of the product that undergoes testing.
.4 Purpose of the product.
.5 Testing devices general outline with short description of equipment applied in testing, and description of each testing procedure, together with date and results of the last calibration on measuring equipment and accuracy of the results obtained.
.6 When considered useful for easier interpretation of testing results diagrams and tables are to be used.
.7 Table display of all significant data before and after the testing has been carried out, including detail description of product after the testing.
.8 Statement that the product is in compliance with the requirements of the Rules or detailed description of those requirements that are not accomplished.

2.3 TYPE APPROVAL CERTIFICATE

2.3.1 Upon approval of the documentation and satisfactory completion of the required type tests the Register may issue to the manufacturers a Type approval certificate.

2.3.2 Type approval certificate is a document which:

.1 Identifies the manufacturer and main characteristics of the product (type and description).
.2 Certifies compliance with the requirements of the Register, Rules, national and international regulations or standards as stated in the Type approval certificate.
.3 Defines range of the application and particular boundary work conditions.
.4 Defines conditions that have to be complied with for maintaining the type approval validity during the period of validity of the Type approval certificate issued.
.5 Identifies approved documentation on the basis of which the product has been manufactured and type approved.

2.4 VALIDITY OF THE TYPE APPROVAL CERTIFICATE

2.4.1 The validity of the Type approval certificate is usually four years, except when the product features stipulate different period of validity as stated in the Type approval certificate.

2.4.2 Generally, three months before the expiry date of the Type approval certificate, the Register shall send a written reminder to the manufacturer.

2.4.3 At least one month before the expiry date of the validity of the Type approval certificate, the manufacturer should apply to the Register in writing, for extension of the validity of the Type approval certificate for another four year period (or otherwise, regarding product features).

2.4.4 The Type approval certificate validity will be renewed with a condition that all the relevant factors significant for type approval remain unchanged and that the repeated
type tests (if so required by the Register) are carried out to the satisfaction of the Register.

2.4.5 If the manufacturer does not respond to the Register with an application for the extension of the validity of the Type approval certificate, the product will be deleted from the List of type approved products, approved manufacturers and service suppliers after the date of validity of Type approval certificate is expired.

2.5 MAINTENANCE OF VALIDITY OF TYPE APPROVAL

2.5.1 Type approval of the product is valid on a condition that during the period of validity of the Type approval certificate, any possible modification (of construction, materials, technology or standards applied during manufacturing of the approved product) is to be approved by the Register.

2.5.2 When experience gained in usage reveal any product's features that do not comply with the requirements of the Rules, or in the case of non-compliance with additional requirements imposed by the Register, the Register reserves the right to cancel the validity of the Type approval certificate before the date of expiry.

2.5.3 When the new Register's Rules, national and international regulations and standards or other amendments (not being at force when the Type approval certificate has been issued) come into force, the Register reserves the right to cancel the validity of previously issued Type approval certificate before the date of expiry.

2.6 SUPERVISION WITH MANUFACTURERS DURING MANUFACTURING OF TYPE APPROVED PRODUCTS

2.6.1 Supervision with manufacturers during manufacturing and testing of type approved products is to be carried out by the Register or organisation authorised by the Register on each particular product.

2.6.2 Upon satisfactory completion of supervision during manufacturing and testing, each particular product is to be marked with the Register's sign or sign of the authorised organisation.

2.6.3 In particular cases supervision procedure as well as marking of the products and certificate issuance may be carried out in accordance with special arrangements between manufacturer and the Register.

2.7 LIST OF TYPE APPROVED PRODUCTS, APPROVED MANUFACTURERS AND SERVICE SUPPLIERS

2.7.1 List of type approved products, approved manufacturers and service suppliers is available on the official website of the Register.
REVIEW OF AMENDMENTS IN RELATION TO PREVIOUS EDITION OF THE RULES

RULES FOR THE CLASSIFICATION OF SHIPS
Part 1 - GENERAL REQUIREMENTS
Chapter 4 - Approval of manufacturers and service suppliers

All major changes in respect to Rules for the classification of ships, Part 1 – General requirements, Chapter 4 – Approval of manufacturers and service suppliers, edition January 2019 throughout the text are shaded (if any).

Items not being indicated as corrected have not been changed.

The grammar and print errors, have been corrected throughout the Rules and are not subject to above indication of changes.
The subject Chapter of this part of the Rules includes the requirements of the following international Organisations:

International Association of Classification Societies (IACS):

Unified Requirements (UR):
    Z17 (Rev. 14, Mar 2019)
Chapter 4  APPROVAL OF MANUFACTURERS AND SERVICE SUPPLIERS

Contents:

1  APPROVAL OF MANUFACTURERS............................................................................................................... 1
   1.1 GENERAL................................................................................................................................................. 1
   1.2 REQUIREMENTS FOR APPROVAL........................................................................................................... 1
   1.3 APPLICATION FOR APPROVAL ............................................................................................................. 1
   1.4 APPROVAL PROCEDURE.......................................................................................................................... 2
   1.5 DECISION ON APPROVAL ..................................................................................................................... 2
   1.6 VALIDITY OF THE CERTIFICATE OF APPROVAL OF THE MANUFACTURER........................................... 3

2  APPROVAL OF SERVICE SUPPLIERS...................................................................................................... 4
   2.1 GENERAL................................................................................................................................................. 4
   2.2 APPLICATION......................................................................................................................................... 4
   2.3 PROCEDURE FOR APPROVAL AND CERTIFICATION............................................................................. 5
   2.4 CERTIFICATION PROCEDURE............................................................................................................... 6
   2.5 DECISION ON APPROVAL OF SERVICE SUPPLIER ............................................................................ 6
   2.6 VALIDITY OF CERTIFICATE OF APPROVAL OF SERVICE SUPPLIER.................................................. 7
   2.7 INFORMATION REGARDING ALTERATIONS TO THE CERTIFIED SERVICE OPERATING SYSTEM........... 7
   2.8 CANCELLATION OF APPROVAL........................................................................................................... 7
1 APPROVAL OF MANUFACTURERS

1.1 GENERAL

1.1.1 This section of this Chapter of the Rules for the classification of ships (hereafter referred to as: the Rules) of CROATIAN REGISTER OF SHIPPING (hereinafter referred to as: the Register) is prescribing requirements for the approval of manufacturers.

Manufacturers producing particular machinery, installations, equipment, devices and materials (hereinafter referred to as products) which in compliance with the requirements of the Rules are subjected to the supervision of the Register, are to be approved by the Register.

Manufacturers of the products for which it cannot be proved that they meet the requirements of the Rules by means of usual methods of testing and supervision, except in case that their manufacture is performed to the prescribed procedures and under controlled conditions (documentation, manufacture, checking during manufacture, identification) shall be approved by the Register.

1.1.2 The objective of the approval is to verify that the manufacturer is able to make and deliver products that are fulfilling the requirements of the Rules regarding quality identification and documentation.

1.1.3 The approval of the manufacturer applies to the manufacturer of the products such as:

1. Rolled steel products:
   a) normal strength, high strength and extra high strength structural steel of normal and improved weldability,
   b) boiler and pressure vessel steel,
   c) steel for low temperature service,
   d) alloy steel including stainless steel,
   e) clad steel.
2. Welded steel sections for hull construction and low temperature service.
3. Steel forgings.
4. Castings (steel, iron and copper alloy).
5. Tubes and pipes.
7. Bars for chain cables.
8. Chain cables and accessories for ship anchor chain.
9. Steel wire rope.
10. Wrought aluminium alloys.
11. Aluminium/steel transition inserts.
12. Pressure vessels manufactured by welding.
13. Synthetic ropes.
15. Components and non-metallic products of non-organic origin.
16. Protective coatings and other anti-corrosive means.

1.1.4 In addition to the manufacturers referred to in 1.1.3., other manufacturers to which the requirements in other parts of the Rules are expressly applied to, shall be approved by the Register.

1.1.5 The manufacturers which have implemented and maintained Quality System according with ISO 9001 standard (or equivalent) with certificates on approval and stamps of other institutions will be considered by the Register in each particular case.

1.1.6 The manufacturers which are not approved in compliance with the requirements of 1.1.1, may be approved by the Register from case to case applying the criteria of the equivalence referred to in the Rules, Chapter 1 - General information, 1.11.

1.1.7 Issuing of the certificate of approval of the manufacturer will not exclude the need for type approval of particular products according to the requirements of the Rules (see the Rules, Chapter 3 - Type approval of products).

1.1.8 Issuing of the certificate of approval of the manufacturer will not exclude the need for supervision and certification of products during regular production.

1.2 REQUIREMENTS FOR APPROVAL

1.2.1 In order to get the approval for production of determined products, the manufacturer shall meet the following requirements:

1. Availability of proper and sufficient equipment for manufacture of product of stable quality and in adequate manner.
2. Availability of sufficient number of qualified professional staff for manufacture of product of required quality.
3. Manufacturing procedures should enable achievement of stable quality products in accordance with the requirements of the Rules, as well as with standards and specifications accepted by the Register.
4. Availability of qualified technical service for quality control including qualified staff and regularly gauged equipment for successful performing of all necessary tests during manufacture in order to verify conformity with the Rule standards, and specifications requirements.
5. If some of tests or all tests are performed by external organization, then such institution as service supplier is required to be approved by the Register. Manufacturer and such institution are obliged to have cooperative agreement.
6. Manufacturer's Quality System is to ensure independent decision making on quality of products to aforementioned technical service for quality control.

1.3 APPLICATION FOR APPROVAL

1.3.1 The manufacturer who wants the manufacture of determined product to be approved by the Register, shall ap-
ply to the Register in writing. The following elaborate shall be enclosed thereto containing:

1.3.2 During survey and testing or afterwards the Register may request additional data or amendments to the elaborate, as deemed necessary, for laying down decision on approval.

1.3.3 After elaborating the relevant documents, the Register shall provide to the manufacturer the approved testing program.

1.3.4 On the basis of data from 1.3.1.8 and 1.3.1.9 the Register may reduce the testing program, or recede from testing, if upon first testing for acceptance on determined products verify full compliance with the requirements of the Rules, standards or specifications applied for that testing.

1.3.5 The Register is liable to keep all obtained data as a manufacturer’s business secret.

The Register may transfer technical data to third parties, with approval in writing of the manufacturers only.

1.3.6 If subcontractor’s representative is a member of the Register’s Assessment Team then the Register’s duty is to oblige him to keep business secret on writing agreement.

1.4 APPROVAL PROCEDURE

1.4.1 The procedure consists of:

1 Checking the condition of the manufacturer and his production possibilities specified in the elaborate, as well as the needs for possible amendments.

.2 Appraisal of the testing results upon testing carried out to approved testing program (and possible additional tests).

1.4.2 Activities under 1.4.1.1 and 1.4.1.2 are to be performed by the Assessment Team appointed by the Register.

1.4.3 In general the Assessment Team consists of a Surveyor from the Head Office who is an expert in manufacture to be approved, and the Surveyor from the Branch office covering the area where the manufacturer is sited.

1.4.4 If the technology of manufacturing particular product is complex, the Register may include other appropriate experts. One of the experts will be appointed as a leader of the Assessment Team (Lead Assessor).

The Register retains the right to engage on contractual basis eminent experts from outside of the Register if deemed it necessary.

1.4.5 On completion of approval procedure, the Assessment Team shall submit to the Certification Commission of the Register detailed assessment report including recommendation regarding approval of the manufacturer.

It is not allowed for a member of the Assessment Team to be also a member of the Certification Commission of the Register.

1.5 DECISION ON APPROVAL

1.5.1 The Certification Commission of the Register shall decide on approval of the manufacturer on the basis of the elaborate, assessment report and appraisal of the testing results (according to approved testing program) submitted by the Assessment Team.

Decision on approval comprise approval of manufacturing of determined product, and also includes the approval of the manufacturer’s Quality System.

If manufacturer has documented Quality System complying with ISO 9001 standard (or equivalent), the Certification Commission of the Register may consider it acceptable.

1.5.2 The manufacturer reserves the right to complain about the decision of the Certification Commission of the Register.

The complaint shall be submitted to the Commission referred to in the regulation 39 of the Charter of the Register.

1.5.3 After laying down the decision on approval of the manufacturer, the certificate of approval of the manufacturer will be issued to the manufacturer, and entry of approved manufacturer in the List of type approved products, approved manufacturers and service suppliers available on the official web site of the Register will be made.
1.6 VALIDITY OF THE CERTIFICATE OF APPROVAL OF THE MANUFACTURER

1.6.1 Certificate of approval of the manufacturer shall be valid for a period of four (4) years, if the manufacturer during that validity period shall meet the requirements as stated in 1.2.

If any of mentioned requirements, or essential method of production happens to be changed, the manufacturer is bound to inform the Register in due time, as well as to apply for the extension of approval to the new method or manufacture.

If the manufacturer shall not proceed as specified, the certificate of approval of the manufacturer may be withdrawn or cancelled and manufacturer deleted from the List of type approved products and approved manufacturers, as well.

1.6.2 Generally, three months before the expiry date of the Certificate of approval of the manufacturer, the Register shall send a written reminder to the manufacturer.

At least one month before the expiry date of the validity of the Certificate, the manufacturer should apply to the Register in writing, for re-assessment for renewal of the validity of the Certificate of approval of the manufacturer.

1.6.3 Re-assessment for renewal of the approval consists of checking at random, and inspection of all production plants and testing facilities used in the manufacture and testing of product, as well as verification of the efficiency of the manufacturer's Quality System.

1.6.4 The Register may, within the term specified in 1.6.1, require performing periodical surveys, if found out that the quality of products has been considerably imperilled, with regard to criteria under which manufacturer has been approved, if receives information on change of the production method independently of the manufacturer, or furthermore, in case of an essential alternation of particular requirements of the Rules, either standards, specifications or conventions.

1.6.5 On completion of periodical, survey Assessment Team shall submit to the manufacturer report inclusive non-conformities found during survey, and term for implementation of the corrective actions.

1.6.6 If the manufacturer does not apply corrective measures within a reasonable time, or does not fulfil additional requirements imposed by the Register, or does not proceed as specified in 1.6.2, then it will be deleted from the List of type approved products, approved manufacturers and service suppliers.
2 APPROVAL OF SERVICE SUPPLIERS

2.1 GENERAL

2.1.1 This section of this Chapter of the Rules is prescribing requirements for approval of service suppliers.

2.1.2 To approve firms providing services, such as measurements, tests or maintenance of safety systems and equipment, the Register is to apply procedures in this section and in the following document of the Register: QP7.5.1-3 - APPROVAL OF SERVICE SUPPLIERS (available upon request).

The Register may also accept results of the services from service suppliers approved by other classification societies, if being IACS members only.

2.2 APPLICATION

2.2.1 This section applies to the approval of the following categories of service suppliers:

2.2.1.1 Statutory services

.1 Firms engaged in servicing inflatable liferafts, inflatable lifejackets, hydrostatic release units, inflatable rescue boats, marine evacuation systems.

.2 Firms engaged in inspections and testing of radio communication equipment.

.3 Firms engaged in inspections and maintenance of self-contained breathing apparatus.

.4 Firms engaged in annual performance testing of Voyage Data Recorders (VDR) and simplified Voyage Data Recorders (S-VDR).

.5 Firms engaged in sound pressure level measurements of public address and general alarm systems on board ships.

.6 Firms engaged in inspections of low location lighting systems using photo luminescent materials and evacuation guidance systems used as an alternative to low-location lighting systems.

.7 Firms engaged in maintenance, thorough examination, operational testing, overhaul and repair of lifeboats and rescue boats, launching appliances and release gear.

.8 Firms engaged in inspection, performance testing and maintenance of Automatic Identification Systems (AIS).

2.2.1.2 Classification and/or Statutory services

.1 Firms engaged in thickness measurements on ships or mobile offshore units.

.2 Firms carrying out an in-water survey on ships and mobile offshore units by diver or Remotely Operated Vehicle (ROV).

.3 Firms engaged in inspections and maintenance of fire extinguishing equipment and systems.

.4 Firms engaged in tightness testing of closing appliances such as hatches, doors etc. with ultrasonic equipment.

.5 Firms engaged in measurements of noise level on board ships.

.6 Firms engaged in examination of Ro-Ro ship’s bow, stern, side and inner doors.

.7 Firms engaged in testing of coating systems in accordance with IMO Resolution MSC.215(82), as amended, and IACS UI SC223 and/or MSC.288(87), as amended.

.8 Firms engaged in survey using Remote Inspection Techniques (RIT) as an alternative means for Close-up Survey of the structure of ships and mobile offshore units.

2.2.2 Where the results of the following service providers:

.1 Firms engaged in thickness measurements on ships or mobile offshore units;

.2 Firms carrying out an in-water survey on ships and mobile offshore units by diver or Remotely Operated Vehicle (ROV);

.3 Firms engaged in tightness testing of closing appliances such as hatches, doors, etc. with ultrasonic equipment;

.4 Firms engaged in survey using Remote Inspection Techniques (RIT) as an alternative means for Close-up Survey of the structure of ships and mobile offshore units;

are used by a Surveyor in making decisions affecting classification services then that service provider must be approved and verified by the Register or by other classification societies, if being IACS members only.

2.2.3 Where such services are used by Surveyors in making decisions affecting statutory certification and service, the firms are subject to approval and verification by the Register where the Register is so authorised by the relevant flag Administration (i.e. the flag of the ship on which the servicing is to be done or the service equipment is to be used). For such services the Register may accept approvals done by:

- the flag Administration itself,

- duly authorized organizations acting on behalf of the flag Administration, or

- other organizations those are acceptable to the flag Administration (e.g. other governments, etc.).

2.2.4 Use of the approved service suppliers is not mandatory for the following services, unless instructed otherwise by the flag Administration with respect to statutory certification

.1 Firms engaged in inspections of low location lighting systems using photo luminescent materials and evacuation guidance systems used as an alternative to low-location lighting systems.
.2 Firms engaged in sound pressure level measurements of public address and general alarm systems on board ships.
.3 Firms engaged in measurements of noise level onboard ships.
.4 Firms engaged in testing of coating systems in accordance with IMO Resolution MSC.215(82) as amended and IACS UI SC223 and/or MSC.288(87) as amended.
.5 Firms engaged in examination of Ro-Ro ships bow, stem, side and inner doors.

2.2.5 Detailed requirements specific to the various categories of suppliers are given in QP7.5.1-3 - APPROVAL OF SERVICE SUPPLIERS. National and/or international requirements may give additional requirements. References to such national and/or international requirements, if any, are also given in QP7.5.1-3 - APPROVAL OF SERVICE SUPPLIERS.

2.3 PROCEDURE FOR APPROVAL AND CERTIFICATION

2.3.1 Submission of documents

2.3.1.1 In order to be approved for the specific activity, service supplier shall submit to the Register an application for approval in writing, which shall include the following documents for review. General requirements are given in 2.3.2, while specific requirements are given in QP7.5.1-3 - APPROVAL OF SERVICE SUPPLIERS.

.1 Outline of the company, e.g. organisation and management structure, including subsidiaries which are to be included in the approval/certification.
.2 List of nominated agents, subsidiaries and subcontractors.
.3 Experience of the company in the specific service area.
.4 For categories of Service Suppliers that require authorization from manufacturers, manufacturer’s documentary evidence that the Service Supplier has been authorized or licensed to service the particular makes and models of equipment for which approval is sought shall be provided.
.5 List of operators/technicians/inspectors with documented training and experience within the relevant service area, and qualifications according to recognised national, international or industrial standards, as relevant.
.6 Description of equipment used for the particular service for which approval is sought.
.7 A guide for operators of such equipment.
.8 Training programmes for operators/technicians/inspectors.
.9 Check lists and record formats for recording results of the service referred to in QP7.5.1-3 - APPROVAL OF SERVICE SUPPLIERS.

.10 Quality Manual and/or documented procedures covering Quality System requirements in 2.3.3.
.11 Documented procedures for communication with the crew prior to commencing work, so that it is safe to decommission the equipment being maintained, and to provide a safe system of work in place.
.12 Evidence of approval/acceptance by other bodies, if any.
.13 Information on the other activities which may present a conflict of interest.
.14 Record of customer claims and of corrective actions requested by certification bodies.

2.3.1.2 The Register will give special consideration to firms with restricted scope of services and/or with three or less employees.

2.3.2 General requirements

2.3.2.1 Extent of Approval - The supplier shall demonstrate, as required by 2.3.2.2 to 2.3.2.11, that it has the competence and control needed to perform services for which approval is sought.

2.3.2.2 Training of personnel - The supplier is responsible for the qualification and training of its personnel to a recognised national, international or industry standard as applicable. Where such standards do not exist, the supplier is to define standards for the training and qualification of its personnel relevant to the functions each is authorized to perform. The personnel shall also have adequate experience and be familiar with the operation of any necessary equipment.

Operators/technicians/inspectors shall have had a minimum of one year tutored on-the-job training. Where it is not possible to perform internal training, a program of external training may be considered as acceptable.

2.3.2.3 Supervision - The supplier shall provide supervision for all services provided. The responsible supervisor shall have had a minimum of two years of experience as an operator/technician/inspector within the activity for which the supplier is approved. For a supplier consisting of one person, that person shall meet the requirements of a supervisor.

2.3.2.4 Personnel records - The supplier shall keep records of the approved operators/technicians/inspectors. The record shall contain information on age, formal education, training and experience for the services for which they are approved.

2.3.2.5 Equipment and facilities - The supplier shall have the necessary equipment and facilities for the service to be supplied. A record of the equipment used shall be kept and available. The record shall contain information on maintenance and results of calibration. The Register shall assess and record the validity of previous measuring results when the equipment is found not to conform to requirements. The Register shall take appropriate action on the equipment affected.

2.3.2.6 Control of data - When computers are used for the acquisition, processing, recording, reporting, storage,
measurement assessment and monitoring of data, the ability of computer software to satisfy the intended application shall be documented and confirmed by the service supplier. This shall be undertaken prior to initial use and reconfirmed as necessary.

Note: Commercial off-the-shelf software (e.g. word-processing, database and statistical programmes) in general use within their designed application range may be considered to be sufficiently validated and do not require any subsequent confirmation.

2.3.2.7 Where several servicing stations are owned by a given company, each station is to be assessed and approved except as specified in 2.3.3.3.

2.3.2.8 Procedures - The supplier shall have documented work procedures covering all services supplied.

2.3.2.9 Subcontractors - The supplier shall give information of agreements and arrangements if any parts of the services provided are subcontracted. Particular emphasis shall be given to quality management by the supplier in following-up such subcontracts. Subcontractors providing anything other than equipment shall also meet requirements of 2.3.2 and 2.3.3.

2.3.2.10 Verification - The supplier shall verify that the services provided are carried out in accordance with approved procedures.

2.3.2.11 Reporting - The report shall be prepared in a form acceptable to the Register. The report should detail the results of inspections, measurements, tests, maintenance and/or repairs carried out. Special guidelines may be found in QP7.5.1-3 - APPROVAL OF SERVICE SUPPLIERS. The report shall include a copy of the Certificate of Approval.

2.3.2.12 Documented procedures and instructions should be available for the recording of damages and defects found during inspection, servicing and repair work. This documentation is to be made available upon request.

2.3.3 Quality system

2.3.3.1 The supplier shall have a documented system covering at least the following:
- Code of conduct for the relevant activity.
- Maintenance and calibration of equipment.
- Training programmes for operators/technicians/inspectors.
- Supervision and verification to ensure compliance with operational procedures.
- Recording and reporting of information.
- Quality management of subsidiaries, agents and subcontractors.
- Job preparation.
- Periodic review of work process procedures, complaints, corrective actions, and maintenance and control of documents.

2.3.3.2 A documented Quality system complying with the most current version of ISO 9000 series and including the above items, would be considered acceptable.

2.3.3.3 If a manufacturer of equipment (and/or its service supplier) applies to the Register for inclusion of its nominated agents and/or subsidiaries in the approval, then it must have implemented a quality system certified in accordance with the most current version of ISO 9000 series. The quality system must contain effective controls of the manufacturer’s (and/or service supplier’s) agents and/or subsidiaries. The nominated agents/subsidiaries must also have in place an equally effective quality system complying with the most current version of ISO 9000 series. Such approvals shall be based upon an evaluation of the quality system implemented by the parent company against the most current version of ISO 9000 series. The Register may require follow-up audits on such agents or subsidiaries against the most current version of ISO 9000 series to confirm adherence to this quality system.

2.3.4 Service suppliers relations with the equipment manufacturer

2.3.4.1 A company which works as a service station for the manufacturer(s) of equipment (and as a service supplier in this field) is to be assessed by the manufacturer(s) and nominated as their agent.

The manufacturer shall ensure that appropriate instruction manuals, material, etc. are available for the agent as well as of proper training of the agent’s technicians. Such suppliers shall be approved either on a case by case basis, or in accordance with 2.3.3.3.

2.4 CERTIFICATION PROCEDURE

2.4.1 Certification of service supplier shall be carried out by the Assessment Team (see 1.4.3). Upon reviewing the submitted documents with satisfactory results, the supplier is to be audited in order to ascertain the supplier is duly organised and managed in accordance with the submitted documents, and that it is considered capable of conducting the services for which approval/certification is sought.

2.4.2 Certification is conditional on a practical demonstration of the performance of the specific service as well as satisfactory reporting being carried out. At renewal audits, evidence of performance, verified by CRS surveyor, since the previous audit is sufficient to satisfy this requirement.

2.4.3 It is not allowed for a member of the Assessment Team to be also a member of the Certification Commission of the Register.

2.5 DECISION ON APPROVAL OF SERVICE SUPPLIER

2.5.1 Upon satisfactory completion of both the audit of the supplier and the demonstration test, as applicable, the Assessment Team shall submit a report to the Certification Commission of the Register for the approval of a service supplier.

The Certification Commission of the Register is then to make decision on issuing of the Certificate of Approval stating that the supplier’s service operation system has been found to be satisfactory and that the results of services performed in accordance with that system may be accepted and utilised by the Register’s Surveyors in making decisions affecting classifica-
tion or statutory certification, as relevant. The Certificate shall clearly state the type and scope of services and any limitations or restrictions imposed including type of equipment and/or names of Manufacturers of equipment where this is a limiting restraint.

2.5.2 After the decision on approval, the Register may include service supplier in the List of type approved products, approved manufacturers and service suppliers on the official web site of the Register.

2.5.3 A service supplier reserves the right to complain about the decision of the Certification Commission of the Register.

The complaint shall be submitted to the Commission referred to in the regulation 39 of the Charter of the Register.

2.6 VALIDITY OF CERTIFICATE OF APPROVAL OF SERVICE SUPPLIER

2.6.1 Renewal of the Certificate is to be made at intervals not exceeding four (4) years by verification through audits that approved conditions are maintained or, where applicable, on expiry of the supplier’s approval received from an equipment Manufacturer, whichever comes first. In the latter case, the Register is to be informed in due course by the Service Supplier.

For firms engaged in thickness measurements, renewal of the Certificate shall be made at intervals not exceeding 3 (three) years, by verification that original conditions are maintained.

2.6.2 Generally, three months before the expiry date of the Certificate of approval of service supplier, the Register shall send a written reminder to the service supplier.

At least 1 (one) month before the expiry date of the validity of the Certificate, the service supplier should apply to the Register in writing, for re-assessment for renewal of the validity of the Certificate of approval of the service supplier.

2.6.3 Re-assessment of the service supplier covers the review of the Quality Manual, work instructions, control sheet with the data on measurement and testing of the equipment to prove that the metrological conditions are complied with, control of the corrective actions and results obtained from procedure dealing with complaints.

Additional testing in order to improve and develop the area of activities of a service supplier may be carried out in the course of assessment.

2.6.4 Within the terms, other than those stated in 2.6.1 and 2.6.2, the Register may require performing of intermediate audit, if considers it necessary for quality of the performed services, implementation or amendments of standards, resolutions, conventions and similar.

Upon such audit the Register may require that the corrective actions are carried out to remedy non-conformities within the specified period of time.

2.7 INFORMATION REGARDING ALTERATIONS TO THE CERTIFIED SERVICE OPERATING SYSTEM

2.7.1 When any alteration to the certified service operating system of the supplier is made, such alteration is to be immediately informed to the Register. Re-audit may be required when deemed necessary by the Register.

2.8 CANCELLATION OF APPROVAL

2.8.1 The Register reserves the right to cancel the approval and to inform the IACS Members accordingly (For Firms engaged in thickness measurements refer to PR23).

2.8.2 Approval of a service supplier may be cancelled in the following cases:

.1 Where the service was improperly carried out or the results were improperly reported.

.2 Where a Surveyor finds deficiencies in the approved service operating system of the service supplier and appropriate corrective action is not taken.

.3 Where alterations have been made to the Company’s Quality System relevant to the service supplier certificates, without written notification to the Register.

.4 Where the intermediate audit, if requested as per 2.6.4, has not been carried out.

.5 Where wilful acts or omissions are ascertained.

.6 Where any deliberate misrepresentation has been made by the Service Supplier.

2.8.3 A supplier whose approval was cancelled, may apply for re-approval after six month period, provided a supplier has corrected the non-conformities which resulted in cancellation, and the Register is able to confirm that supplier has effectively implemented the corrective action. This possibility may not be granted if cancellation has been based on a grave fault, such as violation of ethics.

2.8.4 Expiration or cancellation of the Supplier’s parent company approval automatically invalidates approval of all agents and subsidiaries if these are certified according to 2.3.3.3.
REVIEW OF AMENDMENTS IN RELATION TO PREVIOUS EDITION OF THE RULES

RULES FOR THE CLASSIFICATION OF SHIPS

Part 1 - GENERAL REQUIREMENTS

Chapter 5 – Surveys of ships in service

All major changes in respect to Rules for the classification of ships, Part 1 – General requirements, Chapter 5 – Surveys of ships in service, edition January 2019, as last amended by Amendments No. 1, edition July 2019, throughout the text are shaded (if any).

Items not being indicated as corrected have not been changed.

The grammar and print errors, have been corrected throughout the Rules and are not subject to above indication of changes.
Chapter 5 SURVEYS OF SHIPS IN SERVICE

The subject Chapter of this part of the Rules includes the requirements of the following international Organisations:

International Association of Classification Societies (IACS)

Unified Requirements (UR):

Unified Recommendations:
- No. 36 (Aug 2011, rev. 2), No. 39 (Mar 2009, rev. 3), No. 72 (Apr 2007, rev. 2), No 77 (Oct 2016, rev. 3), No. 87 (May 2015, rev. 2), No. 111 (Feb 2010), No. 131 (Jul 2013), No. 133 (Nov 2013), No. 143 (Oct 2015), No. 144 (Feb 2016)

Unified Interpretations:
- SC 249 (Feb 2013, rev. 1)

Procedural Requirements:
- PR No. 19 (Jul 2017, rev. 1), PR No. 20 (May 2019, rev. 3), PR No. 33 (Jul 2009), PR No. 37 (May 2014, rev. 1)
Contents:

1  GENERAL REQUIREMENTS ................................................................................................................................. 1
   1.1 APPLICATION .................................................................................................................................................. 1
   1.2 DEFINITIONS .................................................................................................................................................. 1
   1.3 DUTIES OF THE COMPANY ........................................................................................................................... 2
2  TYPE OF SURVEYS .............................................................................................................................................. 3
   2.1 INITIAL SURVEY ........................................................................................................................................... 3
   2.2 REGULAR SURVEYS ....................................................................................................................................... 3
   2.3 ALTERNATIVE SURVEYS ............................................................................................................................... 3
   2.4 BOTTOM SURVEY ......................................................................................................................................... 8
   2.5 SURVEY OF PROPELLERS AND PROPELLER SHAFTS ................................................................................... 10
   2.6 OTHER SURVEYS ......................................................................................................................................... 10
3  PREPARATIONS, CONDITIONS AND DOCUMENTATION FOR SURVEY .................................................... 11
   3.1 SURVEY PROGRAMME FOR SHIPS WITH AFFIXED ESP NOTATION ............................................................ 11
   3.2 PREPARATIONS AND CONDITIONS FOR SURVEY – ALL SHIPS ................................................................ 14
   3.3 DOCUMENTATION ....................................................................................................................................... 17
   3.4 REQUIREMENTS FOR SAFE ENTRY TO CONFINED SPACES ......................................................................... 18
4  ANNUAL SURVEY .................................................................................................................................................. 19
   4.1 GENERAL ....................................................................................................................................................... 19
   4.2 HULL AND HULL EQUIPMENT SURVEY - STEEL SHIPS, ALUMINIUM ALLOY SHIPS - ALL SHIPS .............. 19
   4.3 HULL AND HULL EQUIPMENT SURVEY - WOODEN SHIPS, FIBER REINFORCED PLASTIC SHIPS - ALL SHIPS .......................................................... 21
   4.4 MACHINERY, ELECTRICAL EQUIPMENT AND FIRE PROTECTION - ALL SHIPS ........................................ 21
   4.5 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR OIL TANKERS WITH AFFIXED ESP NOTATION OTHER THAN DOUBLE HULL OIL TANKERS ............................................................ 23
   4.6 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR BULK CARRIERS WITH AFFIXED ESP NOTATION ........... 24
   4.7 ANNUAL SURVEY REQUIREMENTS FOR CHEMICAL TANKERS .................................................................. 24
   4.8 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR SHIPS WITH INERT GAS SYSTEM FITTED ....................... 25
   4.9 ANNUAL SURVEY REQUIREMENTS FOR FLOATING UNITS ......................................................................... 25
   4.10 ADDITIONAL ANNUAL SURVEY REQUIREMENTS AFTER DETERMINING COMPLIANCE WITH SOLAS 74, CH. II-I/25, FOR GENERAL CARGO SHIPS WITH SINGLE HOLD ........................................................ 26
   4.11 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR GENERAL DRY CARGO SHIPS ........................................ 26
   4.12 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR LIVE-Stock CARRIERS ............................................................ 27
   4.13 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR FAST VESSELS ........................................................ 27
   4.14 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR RO-RO CARGO SHIPS, PASSENGER SHIPS, RO-RO PASSENGER SHIPS ............................................................................................................. 27
   4.15 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR TECHNICAL FLOATING UNITS .................................. 29
   4.16 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR TUGS AND SUPPLY VESSELS .................................. 30
   4.17 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR FISHING VESSELS .................................................. 30
5  INTERMEDIATE SURVEY .................................................................................................................................... 31
   5.1 GENERAL ....................................................................................................................................................... 31
   5.2 HULL AND HULL EQUIPMENT SURVEY - ALL SHIPS ............................................................................... 31
   5.3 MACHINERY, ELECTRICAL EQUIPMENT AND FIRE PROTECTION ARRANGEMENTS - ALL SHIPS .......... 31
   5.4 ADDITIONAL INTERMEDIATE SURVEY REQUIREMENTS FOR OIL TANKERS WITH AFFIXED ESP NOTATION OTHER THAN DOUBLE HULL OIL TANKERS ............................................................ 31
   5.5 ADDITIONAL INTERMEDIATE SURVEY REQUIREMENTS FOR BULK CARRIERS WITH AFFIXED ESP NOTATION .......................................................... 33
10.5 DETERMINATION OF METALS AND OTHER CONTAMINANTS IN STERN TUBE LUBRICANTS .......................................................................................................................... 69
10.6 SURVEYS OF PROPELLER SHAFTS AND TUBE SHAFTS .............................................................................................................. 72
10.7 PROPELLER SHAFT CONDITION MONITORING (PMON) ........................................................................................................... 79
11 ELECTRICAL EQUIPMENT .................................................................................................................................................... 80
11.1 ANNUAL AND INTERMEDIATE SURVEYS ............................................................................................................................. 80
11.2 COMPLETE SURVEYS ....................................................................................................................................................... 80
11.3 SURVEYS OF ELECTRICAL EQUIPMENT DURING DOCKING SURVEY ........................................................................... 81
12 REFRIGERATING PLANT ......................................................................................................................................................... 82
12.1 ANNUAL SURVEY REQUIREMENTS ................................................................................................................................... 82
12.2 RENEWAL SURVEY REQUIREMENTS ................................................................................................................................ 83

ANNEX A - HULL SURVEYS OF CHEMICAL TANKERS
ANNEX B - HULL SURVEYS OF DOUBLE HULL OIL TANKERS
ANNEX C1 - HULL SURVEYS OF SINGLE SKIN BULK CARRIERS
ANNEX C - HULL SURVEYS OF DOUBLE SKIN BULK CARRIERS
ANNEX D - SKETCHES
1 GENERAL REQUIREMENTS

1.1 APPLICATION

1.1.1 The requirements of this Chapter of the Rules for the classification of ships (hereafter referred to as: the Rules) of CROATIAN REGISTER OF SHIPPING (hereafter referred to as: the Register) are applicable to existing ships subjected to classification survey by the Register.

While performing surveys the requirements of the Rules relating to ships in service are applicable.

Each specific case not covered by the Rules is considered separately in extent as deemed necessary by the Register.

1.1.2 This Chapter of the Rules is not applicable to existing ships in cases of major modifications or conversions, significant repairs, modifications or alternations of the equipment, as well as, when the purpose of the ship, navigation area or number of passengers onboard occurs.

1.1.3 For all other class type notations not specifically listed requirements for all ships apply.

1.1.4 For surveys of hull, hull equipment, machinery installation and electrical equipment of vessels with type notation Yacht, appropriate items of Ch. 3 of the Rules for Statutory certification of boats and yachts shall apply.

1.2 DEFINITIONS

1.2.1 Ballast tank - a tank that is being used primarily for water ballast.

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 73/78 Annex I/18(3) are to be treated as cargo tanks.

Corrosion protection coating for salt water ballast spaces – at the time of new construction, all salt water ballast spaces having boundaries formed by the hull envelope shall have an efficient protective coating, epoxy or equivalent, applied in accordance with the manufacturer’s recommendations.

1.2.2 Spaces - separate compartments such as holds and tanks, tanks, cofferdams and void spaces belonging cargo holds, decks and the outer hull.

1.2.3 Overall survey - a survey intended to report on overall condition of the hull structure and to determine the extent of additional Close-up survey.

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

1.2.5 Transverse section - includes all longitudinal members such as plating, longitudinals and girders at the deck, side, bottom, inner bottom and, longitudinal bulkheads. For transversely framed ships, a transverse section includes adjacent frames and their end connections in way of transverse sections.

1.2.6 Representative spaces - those spaces 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 is to be taken of the service and repair history on board and identifiable Critical Structural Areas and or Suspect areas.

1.2.7 Suspect areas - locations showing Substantial corrosion and/or are considered by the Surveyor to be prone to rapid wastage.

1.2.8 Substantial corrosion - 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 tnet + 0.5 mm and tnet.

1.2.9 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.

1.2.10 Coating condition - is defined as follows:

1.1 GOOD - condition with only minor spot rusting.

2 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.

3 POOR - condition with general breakdown of coating over 20 % or more, or hard scale at 10% or more, of areas under consideration.

NOTE: Reference is made to IACS Recommendation No.87 “Guidelines for Coating Maintenance & Repairs for Ballast Tanks and Combined Cargo/Ballast Tanks on Oil Tankers”.

1.2.11 Critical structural areas - 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 applicable to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.

1.2.12 Cargo length area - that part of the ship which contains all cargo holds and adjacent areas including fuel tanks, cofferdams, ballast tanks and void spaces (or for tankers all cargo tanks, slop tanks, cargo/ballast pump rooms, cofferdams, ballast tanks and void spaces adjacent to cargo tanks and also deck areas throughout the entire length and breadth of the ship over the above mentioned spaces).

1.2.13 Special consideration - 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.

1.2.14 Remote Inspection Techniques (RIT). Remote Inspection Technique 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).

1.2.15 Corrosion protection coatings for cargo hold spaces on bulk carriers. New bulk carriers (built on or after 1st July 1998) are to have an efficient hard protective coating (epoxy coating or equivalent) applied in accordance with the manufacturer’s recommendation on all internal and external surfaces of hatch coamings and hatch covers, and all internal surfaces of the cargo holds, excluding the flat tank top areas and the hopper tanks sloping plating approximately 300 [mm] below the side shell frame and brackets.

For existing bulk carriers built before 1st July 1998, where the Company may elect to coat or re-coat 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 the Surveyor.

1.2.16 Oil tanker - for the purpose of this Chapter of the Rules an Oil Tanker is a ship which is constructed primarily to carry oil in bulk and includes ship types such as combination carriers (Ore/Oil ships, etc.).

1.2.17 All other definitions related to this Chapter are given in the Annex A, Annex B, Annex C, Annex C1 and the Part 1- General requirements, Ch. 1 - General information, 2.

1.2.18 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 classification, or recommendation.

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

1.2.20 General Dry Cargo Ships - are all self-propelled ships of 500 GT and above carrying solid cargoes other than:
- bulk carriers with affixed ESP notation;
- 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;
- deck cargo ships (see note);
- general dry cargo ships of double side-skin construction, with double side-skin extending for the entire length of the cargo area, and for the entire height of the cargo hold to the upper deck.

NOTE: A deck cargo ship is a ship that is designed to carry cargo exclusively above deck without any access for cargo below deck.

1.2.21 For General Dry Cargo Ships with hybrid cargo hold arrangements, e.g. with some cargo holds of single-side skin and others of double-side skin, the requirements for General Dry Cargo Ships are to be applied only to structure in way of the single-side skin cargo hold region.

1.2.22 Company - Shipowner, as defined in 2.12 of the Rules, Part 1- General requirements, Ch. 1 - General information.

1.3 DUTIES OF THE COMPANY

1.3.1 Surveys are performed on the basis of a request submitted by the Company or her representative. The Company is responsible for the organisation of the survey in accordance with the terms stated in the Rules, as well as for keeping certificates, books and other documents issued by the Register valid.

1.3.2 The Company is to inform the Register without any delay in cases stated in the Rules, Part 1- General requirements, Ch. 1 - General information, 3.11.

1.3.3 The Company should supply and maintain on board documentation as specified in 3.3.

Operating and maintenance instructions and drawings required for the main propulsion and all other essential services are to be in a language understood by the engineering officers and crew.

1.3.4 The Company is to provide Conditions for survey as specified in 3.2.
2 TYPE OF SURVEYS

2.1 INITIAL SURVEY

See the Rules, Part 1 - General requirements, Ch. 2 – Survey during construction and initial survey, 2.2.

2.2 REGULAR SURVEYS

2.2.1 General

2.2.1.1 Regular surveys are obligatory surveys to which a ship is subjected in time intervals prescribed by the Rules, and should be conducted at once or according to Continuous survey scheme in allowed time window.

Ships on the Continuous survey system are not exempted from other regular surveys (i.e. Intermediate survey).

2.2.2 Annual survey

2.2.2.1 An Annual survey is a general inspection of the items covered by the Rules and is to be held within three months before or after each anniversary date of the Certificate of Class. An Annual survey should enable the Register to verify that the condition of hull structures, machinery installations and equipment is being maintained in accordance with the Rules.

2.2.3 Intermediate survey

2.2.3.1 An Intermediate survey is an inspection of the items covered by the Rules and should enable the Register to verify that the ship is being properly maintained taking into account the purpose of the ship.

2.2.3.2 The Intermediate survey should be held within three months before or after the second anniversary date or within three months before or after the third anniversary date of the Certificate of Class and should take the place of one of the Annual surveys. Survey of the items, additional to Annual survey requirements (regarding ballast tanks and cargo holds), may commence at the second Annual survey and be progressed during the succeeding year with a view to completion by the end of the third Annual survey (i.e. during 18 (eighteen) months time-window).

2.2.4 Renewal survey

2.2.4.1 Renewal survey is an inspection of items relevant to the Certificate of Class that include in addition to the requirements of the Annual survey, examination, test and checks of sufficient extent to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended for the next period of validity of the Certificate of Class with the requirement that it is properly maintained and subjected to surveys as it is prescribed by the Rules.

Renewal survey may commence at the 4th Annual survey and be progressed with a view to completion by the 5th anniversary date. When the Renewal 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 Renewal survey. For such surveys carried out on several occasions or split between different survey stations, surveyed items are to be recorded on a master list of hull items (Renewal Survey List – Hull).

A survey meeting is to be held prior to the commencement of the survey (see also 3.2.5).

As a part of the preparation for the Renewal survey, thickness measurement may be carried out. Results of the thickness measurement may not be accepted for the Renewal survey if they were obtained more than fifteen months prior to the due date of the Renewal survey.

2.2.4.2 If the Renewal survey has been completed within the time interval of 3 (three) months before the due date of the Certificate of Class, the new certificate is to be issued according to the due date of such previously issued certificate.

If the Renewal survey has been completed more than 3 (three) months before the due date of the Certificate of Class, the new certificate is to be issued according to the date of the completion of such survey.

If the Renewal survey has been completed after the due date of the Certificate of Class, the new certificate is to be issued according to the due date of such previously issued certificate (see the Rules, Part 1 - Chapter 1, General information, 5.5).

If the Renewal survey has been performed concurrently with major repairs / reconstruction / modifications, for completion of which longer period of time is needed, the new Certificate of Class will be issued according to the date of the completion of such repairs / reconstruction / modifications.

2.2.4.3 Renewal survey leads to the issue of a new Certificate of Class, while other regular survey leads to the endorsement of existing Certificate of Class.

2.3 ALTERNATIVE SURVEYS

Owner’s hull inspection and maintenance schemes shall be encouraged as means for maintaining compliance with classification and statutory requirements between the surveys. However, these schemes are not to be accepted as an alternative to, or a substitute for, the performance of required classification and/or statutory surveys of the hull by the Surveyors of the Register, or of another IACS class society with which the ship is dually classed.

2.3.1 Continuous survey

2.3.1.1 The Register may, upon request from the Company, as an alternative to the Renewal surveys accept Continuous surveys of the hull structures (CSH) and/or machinery installations (CSM) and/or refrigerating plant installations (CSR). Instead of surveys being performed at once (as stated for Renewal survey), according to the Continuous survey scheme it is allowed that every year, 20 to 25% of the items covered by the Continuous hull and/or machinery and/or refrigerating plant survey scheme are to be surveyed, with a condition that all the items are to be surveyed within the expiration date of the Certificate of Class. The interval between consecutive examinations of each item is not to exceed five (5) years (with possibility of postponement for up to three months). Satisfactory completion of the items of Continuous
survey is a prerequisite for issuing the new Certificate of Class.

2.3.2.2 Continuous survey scheme for hull is not allowed for oil tankers, chemical tankers, bulk carriers, ore carriers and combination carriers on which the Enhanced Survey Programme is applied and for general dry cargo ships

For those and other ships that are not surveyed according to Continuous survey scheme see 2.2.4.1.

2.3.1.4 Ships covered by the Continuous hull and/or machinery and/or refrigerating plant survey scheme are not exempted from the Annual and Intermediate surveys. For ships more than 10 years of age, the ballast tanks are to be internally examined twice in each period of validity of the Certificate of Class, i.e. once within the scope of the intermediate survey and once within the scope of the continuous system for the hull Renewal survey.

2.3.1.5 A special note is to be stated in the Certificate of Class if the Continuous hull and/or machinery and/or refrigerating plant survey scheme is applied.

2.3.1.6 The Register may, upon request of the Company, accept that some of the Continuous machinery survey items may be carried out by the Chief Engineer. The conditions for granting this type of survey arrangement, as well as its extent are stated in 2.3.2.

2.3.2 Surveys by the Chief Engineer

2.3.2.1 The Register may, as stated in 2.3.1, upon the Company’s, accept that part of the Continuous machinery surveys may be carried out by the Chief Engineer. The conditions for granting this type of survey arrangement will normally be:

.1 The Company must confirm the required qualifications for the Chief Engineer.

.2 Half of all items by the Continuous machinery survey scheme, of which there are more than one, may be surveyed by the Chief Engineer (i.e. the Chief Engineer may survey half of all identical items in one cycle of the class term). Auxiliary diesel engines and turbines may wholly be surveyed by the Chief Engineer.

.3 All surveys carried out under supervision of the Chief Engineer are to be recorded in the engine log book and relevant extracts are to be submitted to the Register.

2.3.2.2 The Chief Engineer is to obey the following regulations:

.1 All surveys taking place at ports where the Register is represented are to be carried out by the Surveyors.

.2 The Chief Engineer is not allowed to perform the survey of the same item twice successively.

.3 Generator parallel operation, generator load test, and testing of protection devices for generators and switchboards are to be witnessed by the Surveyor.

.4 Test run, including testing of safety functions of auxiliary diesel engines and turbines are to be carried out by the Surveyor.

.5 Survey of the items covering automation is to be carried out by the Surveyor.

.6 Survey of the pressure vessels is to be carried out by the Surveyor.

2.3.3 Survey arrangement based on approved planned maintenance scheme for machinery

2.3.3.1 For items of machinery and automation system which are subject to the Continuous machinery survey scheme (CSM, see 2.3.1) the Register may grant an approval of the planned maintenance scheme (PMS) and a survey arrangement adopted stating the extent and method of survey. This scheme is limited to components and systems covered by CSM.

2.3.3.2 Approved PMS considers surveys to be carried out on the basis of intervals between overhauls recommended by manufacturers, documented operator’s experience and condition monitoring where fitted.

In general, the intervals for PMS shall not exceed those specified for CSM. 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 manufacturers recommendations.

2.3.3.3 The Chief Engineer is responsible person on board in charge with the PMS. Documentation on overhauls of items covered by the PMS shall be reported and signed by the chief engineer.

2.3.3.4 Any items not covered by the PMS shall be surveyed and credited in the usual way.

2.3.3.5 The approval of the PMS machinery shall be based on a concentrated description of the maintenance system sufficiently detailed to serve as basis for the approval.

The approval documentation is to be in the English language and is to be submitted by the Company.

2.3.3.6 To be considered for approval of a PMS, the Company is to make a formal request to the Register accompanied by the following information and documents:

.1 Documentation to be submitted initially:
   a) organisation chart identifying areas of responsibility,
   b) documentation filling procedures,
   c) listing of equipment to be considered by classification in PMS,
   d) machinery identification procedure,
   e) preventive maintenance sheet(s) for each machine to be considered,
   f) listing and schedule of preventive maintenance procedures.

.2 In addition to the above documentation the following information shall be available on board:
   a) all clauses in 2.3.3.6.1 in an up-to-date fashion,
   b) maintenance instructions (manufacturer’s and/or shipyard’s),
   c) reference documentation (trend investigation procedures, etc.),
   d) records of maintenance including repairs and renewals carried out.
2.3.3.7 An annual report covering the years’ service, including the information as required under the clauses c) and e) as well as the information on changes to other clauses in 2.3.3.6.1, shall be given to the Register for review.

2.3.3.8 When the PMS is approved an approval document for survey arrangement will be issued for the vessel stating the extent and method of survey. The approval document is to be kept onboard.

2.3.3.9 The PMS shall be programmed and maintained by a computerised system. However, this may not be applied to the current already approved schemes.

The documentation used in the PMS in the form of books, set of cards, etc. are to be given a specific identification for later references.

Access to computerised systems for updating of the maintenance documentation and maintenance program shall only be permitted by the chief engineer or other authorized person. Computerised systems are to include back-up disks/tapes or CDs, which are to be updated at regular intervals. Computerised systems are to be approved by the Register.

2.3.3.10 The implementation survey shall be carried out to confirm the validity of the approval. The implementation survey shall be carried by the Register’s Surveyor within one year from the date of approval of the PMS.

During the implementation survey the following shall be verified by a Surveyor to insure:

.1 The PMS is implemented according to the approval documentation and is adapted to the type and complexity of the components/systems on board.

.2 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.

.3 The onboard personnel is familiar with the PMS.

When this survey is carried out and the implementation is found in order, a report describing the PMS shall be submitted to the Register and the approved PMS may replace the CSM.

2.3.3.11 An Annual Audit is to be carried out to maintain the validity of PMS. An Annual Audit shall be carried out by a Register’s Surveyor and preferably concurrently with the annual survey of machinery.

During the Annual Audit the following shall be verified by a Surveyor:

.1 The Surveyor shall review the annual report or verify that it has been reviewed by the Register.

2. 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.

3. 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.

4. Written details of break-down or malfunction shall be made available.

5. 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-possible until examined by a Register’s Surveyor.

Upon satisfactory completion of the above requirements, the Register shall retain the PMS.

2.3.3.12 The damage of components/machinery shall be reported to the Register. The repairs of such damaged components/machinery shall be carried out to the satisfaction of the Surveyor of the Register.

Any repair and corrective action regarding machinery under PMS system shall be recorded in the PMS log-book and repair verified by the Surveyor of the Register at the Annual Audit.

In the case of overdue outstanding recommendations or a record of unprepared damage which would affect the PMS, the relevant items shall be kept out of the PMS until the recommendation is fulfilled or the repair is carried out.

2.3.3.13 The survey arrangement for machinery under PMS can be cancelled by the Register if PMS 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, i.e. approval document will be withdrawn. The conditions for ordinary Continuous survey of machinery will then be introduced.

2.3.3.14 In case of sale or change of management of the vessel or transfer of class the Register will automatically cancel the approval document and the approval is to be reconsidered.

2.3.3.15 The ship Company may, at any time, cancel the survey arrangement for machinery under PMS by informing the Register 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.

2.3.4 Condition Monitoring and Condition Based Maintenance

2.3.4.1 General

2.3.4.1.1 Application

2.3.4.1.1.1 These requirements apply to the approved Condition Monitoring and Condition Based Maintenance schemes where the condition monitoring results are used to influence the scope and/or frequency of Class survey.

2.3.4.1.1.2 This scheme may be applied to components and systems covered by Continuous Machinery Survey (CMS), and other components and systems as requested by the owner. The extent of Condition Based Maintenance and associated monitoring equipment to be included in the maintenance scheme is decided by the Owner.
2.3.4.1.3 These requirements can be applied only to vessels operating on approved PMS survey scheme.

2.3.4.1.4 The scheme may be applied to any individual items and systems. Any items not covered by the scheme shall be surveyed and credited in accordance with the requirements of 2.3.1 and/or 2.3.3.

2.3.4.1.2 Definitions

2.3.4.1.2.1 The following standard terms are defined in ISO 13372:2012:

1. **Condition monitoring**: acquisition and processing of information and data that indicate the state of a machine over time. The machine state deteriorates if faults or failures occur.

2. **Diagnostic**: examination of symptoms and syndromes to determine the nature of faults or failures.

3. **Condition Based Maintenance**: maintenance performed as governed by condition monitoring programmes.

2.3.4.1.3 Condition Monitoring (CM)

2.3.4.1.3.1 Where an approved condition monitoring system is fitted, credit for survey may be based on acceptable condition monitoring results. The condition monitoring results are to be reviewed during the annual audit.

2.3.4.1.3.2 Limiting parameters are to be based on the Original Equipment Manufacturers guidelines (OEM), or a recognised international standard.

2.3.4.1.3.3 The condition monitoring system is to provide an equivalent or greater degree of confidence in the condition of the machinery to traditional survey techniques.

2.3.4.1.3.4 The condition monitoring system shall be approved in accordance with the Register’s procedures.

2.3.4.1.3.5 A condition monitoring system may be used to provide a greater understanding of equipment condition, and a condition based maintenance scheme may be used to obtain maintenance efficiency. Class approval is required where owners wish to change the survey cycle based on CM/CBM.

2.3.4.1.3.6 Software systems can use complex algorithms, machine learning and knowledge of global equipment populations/defect data in order to identify acceptability for continued service or the requirement for maintenance. These systems may be independent of the OEM recommended maintenance and condition monitoring suggested limits. Approval of this type of software is to be based on OEM recommendations, industry standards and Register’s experience.

2.3.4.1.3.7 The Register retains the right to test or open-up the machinery, irrespective of the CM results, if deemed necessary.

2.3.4.1.4 Condition Based Maintenance (CBM)

2.3.4.1.4.1 Where an owner wishes to base their equipment maintenance on a CBM approach, this is to meet the requirements of the ISM Code.

2.3.4.1.4.2 Where an agreed planned maintenance and CBM scheme is in operation, the CMS and other survey intervals may be extended based on OEM maintenance recommendations and acceptable condition monitoring results.

2.3.4.1.4.3 Limiting parameters (alarms and warnings) are to be based on the OEM guidelines, or a recognised international standard.

2.3.4.1.4.4 The CBM scheme is to provide an equivalent or greater degree of confidence in the condition of the machinery to traditional maintenance techniques.

2.3.4.1.4.5 The scheme shall be approved in accordance with the Register’s procedures.

2.3.4.1.4.6 Software systems can use complex algorithms, machine learning and knowledge of global equipment populations/defect data in order to identify acceptability for continued service or the requirement for maintenance. These systems may be independent of the OEM recommended maintenance and condition monitoring suggested limits. Approval of this type of software is to be based on OEM recommendations, industry standards and Register’s experience.

2.3.4.2 Procedures and Conditions for approval of CM and CBM

2.3.4.2.1 Onboard Responsibility

2.3.4.2.1.1 The chief engineer shall be the responsible person on board in charge of the CM and CBM.

2.3.4.2.1.2 Documentation on the overhaul of items covered by CM and CBM schemes shall be reported by the chief engineer.

2.3.4.2.1.3 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.

2.3.4.2.1.4 All personnel involved in CM and CBM shall be appropriately qualified.

**NOTE**: CM does not replace routine surveillance or the chief engineer’s responsibility for taking decisions in accordance with his judgement.

2.3.4.2.2 Equipment and System Requirements

2.3.4.2.2.1 CM equipment and systems shall be approved in accordance with a procedure of the Register.

2.3.4.2.2.2 The CM/CBM scheme and its extent, are to be approved by the Register.

2.3.4.2.2.3 The CBM scheme is to be capable of producing a condition report, and maintenance recommendations.

2.3.4.2.2.4 A system is to be provided to identify where limiting parameters (alarms and warnings) are modified during the operation of the scheme.

2.3.4.2.2.5 Where CM and CBM schemes use remote monitoring and diagnosis (i.e. data is transferred from the vessel and analysed remotely), the system is to meet the applicable standards for Cyber Safety and Security. The system shall be capable of continued onboard operation in the event of loss of the communication function.

2.3.4.2.2.6 CBM schemes are to identify defects and unexpected failures that were not prevented by the CM system.
2.3.4.2.2.7 Systems shall include a method of backing up data at regular intervals.

2.3.4.2.3 Documentation and Information

2.3.4.2.3.1 The following documentation shall be made available to the Register for the approval of the scheme:

1. Procedure for changes to software system and CM parameters;
2. Listing of equipment to be included in the scheme;
3. Listing of acceptable condition monitoring parameters;
4. Description of CBM scheme;
5. Listing, specifications and maintenance procedures for condition monitoring equipment;
6. Baseline data for equipment with condition monitoring;
7. Qualification of personnel and company responsible for analysing CM results.

2.3.4.2.3.2 In addition to the above documentation the following information shall be available on board:

1. All clauses in 2.3.4.2.3.1 in an up-to-date fashion
2. Maintenance instructions (manufacturer’s and shipyard’s);
3. Condition monitoring data including all data since last opening of the machine and the original base line data;
4. Reference documentation (trend investigation procedures etc.);
5. Records of maintenance including repairs and renewals carried out;
6. Records of changes to software systems and parameters;
7. Sensors calibration records / certification / status.

2.3.4.2.4 Approval validity

2.3.4.2.4.1 An Annual Audit shall be carried out to maintain the validity of the CM/CBM scheme.

2.3.4.2.4.2 The survey arrangement for machinery under CM/CBM can be cancelled by the Register if the scheme is not being satisfactorily carried out either from the maintenance records or the general condition of the machinery.

2.3.4.2.4.3 The case of sale or change of management of the ship or transfer of class shall cause the approval to be reconsidered.

2.3.4.2.4.4 The ship owner may, at any time, cancel the survey arrangement for machinery under the scheme by informing the Register in writing and for this case the items which have been inspected under the scheme since the last annual Audit can be credited for class at the discretion of the attending surveyor.

2.3.4.3 Surveys

2.3.4.3.1 Installation Survey

2.3.4.3.1.1 Condition monitoring equipment is to be installed and surveyed in accordance with Register rules, and a set of base line readings is to be taken.

2.3.4.3.2 Implementation Survey

2.3.4.3.2.1 The Implementation Survey shall be carried out by the Register’s surveyor no earlier than 6 months after installation survey and no later than the first Class annual survey.

2.3.4.3.2.2 During the Implementation survey the following shall be verified by a surveyor:

1. the CM/CBM scheme is implemented according to the approval documentation, including a comparison with baseline data;
2. the scheme is producing the documentation required for the Annual Audit and the requirements of surveys and testing for the maintenance of class are complied with;
3. the onboard personnel are familiar with operating the scheme;
4. records of any limiting parameters (alarms and warnings) that have been modified during the operation of the scheme;
5. Records of any failures of monitored equipment are to be reviewed to ensure that the condition monitoring scheme is effective / sufficient.

2.3.4.3.2.3 When this survey is carried out and the implementation is found in order, a report describing the scheme shall be submitted to the Register and the scheme may be put into service.

2.3.4.3.3 Annual Audit

2.3.4.3.3.1 An annual audit of the CM and CBM scheme shall be carried out by a Register’s surveyor concurrently with the Class annual survey.

2.3.4.3.3.2 The purpose of this audit shall be to verify that the scheme is being correctly operated and that the machinery has been functioning satisfactorily since the previous audit. This is to include any limiting parameters (alarms and warnings) that have been modified since the last audit. A general examination of the items concerned shall be carried out.

2.3.4.3.3.3 The performance, condition monitoring 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.

2.3.4.3.3.4 Written details of break-down or malfunction shall be made available.

2.3.4.3.3.5 At the discretion of the surveyor, function tests, confirmatory surveys and random check readings, where Condition Monitoring / Condition Based Maintenance equipment is in use, shall be carried out as far as practicable and reasonable.

2.3.4.3.3.6 The familiarity of the chief engineer and other personnel involved with the CM system shall be verified.

2.3.4.3.3.7 Calibration status of sensors and equipment shall be verified.

2.3.4.3.3.8 Verification that the suitability of the CM/CBM scheme has been reviewed following defects and failures shall be carried out.
2.3.4.3.4 Damage and repairs

2.3.4.3.4.1 Damage to components or items of machinery is to be reported to the Register. The repairs of such damaged components or items of machinery are to be carried out to the satisfaction of the Surveyor.

2.3.4.3.4.2 Details of repairs and maintenance 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 the Register’s Surveyor.

2.3.4.3.4.3 A detailed report of repairs and maintenance is to be carried in the Register.

2.3.4.3.4.4 Details of repairs and maintenance carried out shall be recorded in the Register.

2.3.4.3.5 Surveys of vessels out of commission (lay-up vessels)

2.3.4.3.5.1 In order to maintain class during lay-up period the following surveys are required to be carried out:

1. Annual survey every 12 months from the starting date of their lay-up condition, in the scope agreed with the Register for each particular vessel depending on its lay-up condition.
2. Machinery, arrangements and components in use (to be surveyed as normally required by the Rules).

2.3.4.3.5.2 The following survey requirements are to be followed:

1. Manned vessels during lay-up period shall comply with class requirements regarding fire safety (requirements may be limited to certain areas only, if such arrangement is specifically agreed with the Register).
2. If Renewal survey becomes due / overdue during the lay-up period, a Renewal lay-up survey should be carried out in addition to Annual lay-up survey. The scope of the Renewal lay-up survey will be reduced compared to a main class Renewal survey, and agreed with the Register for each particular case, but shall at least cover water-tight integrity, hull strength, pollution prevention, anchoring and mooring equipment. Thickness measurement may be required when and if found necessary by the attending Surveyor.
3. As long as regular and agreed surveys during lay-up period are conducted to the satisfaction of the Register there is no time limit for how long a vessel can be laid-up.

2.3.5 Scope of re-commissioning survey of a laid-up vessel depends on several factors, such as time in lay-up, maintenance and preservation measures taken during lay-up, survey status at the time of re-commissioning, reason for re-commissioning (such as, but not limited to: single voyage for scrap, single voyage to repair yard, etc.), age and the type of a vessel.

For vessels which have been laid-up for a period up to 12 months, an occasional survey is to be carried out, covering imminently due and overdue surveys, only. In addition to that, a visual inspection of other class related items, not covered by previous requirement, may be required when and if found necessary by the attending Surveyor.

For vessels which have been laid-up for a period more than 12 months, an occasional survey is to be carried out, covering all imminently due and overdue surveys. In addition to that a sea trial for functional testing of the machinery installation is to be carried out also. The scope of survey may be additionally increased if deemed necessary by the attending Surveyor (e.g. in case of longer lay-up periods with no preservation measures or maintenance).

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 Renewal survey. If the owner elects to carry out the next due Renewal survey, the period of class will start from the survey completion date.

2.3.5.4 For additional statutory requirements special instructions from the relevant Flag State Administration, or from local Port State authorities shall apply.

2.4 BOTTOM SURVEY

2.4.1 Docking survey

2.4.1.1 For all steel ships, except for passenger ships, there should be a minimum of two inspections of the outside of the ship’s bottom during each five year period of validity of the Certificate of Class/Cargo Ship Safety Construction Certificate or when applicable Certificate on the ship’s ability for navigation. Inspection of the outside of ship’s bottom should normally be carried out with the ship in a dry dock. However, consideration may be given to alternate examination while the ship is afloat as an In-water Survey, subject to provisions of 2.4.2. Special consideration is to be given to ships of 15 years or over before being permitted to have such examinations. For ESP ships exceeding of 15 years of age and over, such examinations are to be carried out with the ship in dry dock.

A minimum of two inspections of the outside of the ships bottom are to be carried out during the renewal period of five years and the intervals between any two inspections shall not 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 (see Chapter 1, 5.5.1).

“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”.  

8 RULES FOR THE CLASSIFICATION OF SHIPS PART 1 - CHAPTER 5
Administrations may give consideration to alternate inspections being carried out with the ship afloat through Pilot Extended Dry-Docking (EDD) schemes which extend the interval between surveys in dry-dock. Qualifying ships may be permitted to carry out two consecutive in-water surveys, subject to the conditions determined by the Register and agreed through tripartite projects between the Owner, Flag State Administration and the Register. Acceptance into such a Pilot scheme is subject to the formal written agreement with the ship’s Flag State Administration including any additional specific Flag State Administration requirements.

The following ships and ship types are not eligible for the EDD scheme described in these guidelines:
- passenger ships;
- ships subject to the Enhanced Survey Program (ESP);
- general dry cargo ships
- ships fitted with propulsion thrusters;
- ships where the propeller connection to the shaft is by means of a keyed taper;
- High Speed Craft (HSC).

Ships eligible for the EDD scheme are to meet following provisions and conditions:
- the ship should comply with the In-Water Survey provisions;
- protective coating in double bottom/double side ballast tanks, void spaces and all other spaces adjacent to the shell should be maintained in GOOD condition;
- the shafting arrangement should fulfill the requirements for Tailshaft Condition Monitoring Survey Arrangement;
- hull maintenance scheme is to be implemented in accordance with ISM requirements.

NOTE: Notwithstanding the above stated, in case of dually classed vessels, EDD is to be additionally agreed with the other classification society. When, for the dually classed vessel, the Pilot Extended Dry-docking (EDD) has already been agreed by the other classification society, the Register may accept requirements which differ from the ones listed above, while the prerequisite to obtain the consent from the Owner and the Flag State Administration on the EDD remains to be applicable.

2.4.1.2 For cargo ships with GT \( \geq 500 \) one of two Docking surveys is to be carried out on or after the fourth annual survey in conjunction with the renewal of the Cargo Ship Safety Construction Certificate or when applicable Certificate on the ship’s ability for navigation.

2.4.1.3 For ships made of wood, aluminium alloys and reinforced plastics Rules for technical supervision of ships made of wood, aluminium alloys and reinforced plastics shall apply.

2.4.1.4 For fishing vessels Rules for statutory certification of fishing vessels shall apply.

2.4.1.5 For passenger ships an inspection of the ship’s bottom is required annually. In a five year class period, two of such inspections are to take place out of water. The maximum interval between these inspections is 36 months. IWS may be carried out each year when an inspection out of water is not required. For ships older than 15 years, performance of IWS is subjected to special consideration and approval of the Register.

2.4.1.6 For passenger ships up to 15 years of age, other than ro-ro passenger ships, and where acceptable to Flag State Administration, the minimum number of docking surveys (inspections in dry-dock of the outside of bottom) in any five-year period of class may be reduced from two to one. In such cases the interval between consecutive inspections in dry dock should not exceed 60 months.

2.4.1.7 For passenger ships made of steel and not engaged in international voyages (area of navigation 5 to 8) and up to 12 years of age, the docking survey may be carried out as specified in 2.4.1.1, or as specified in 2.4.1.6., based on the special consideration of the Register.

2.4.1.8 Time intervals and due dates for Docking surveys are given in Table 6.1-1, and extent of requirements in 6.

2.4.1.9 If the Society with which the vessel is dually classed with applies different intervals for dry-docking surveys the Register may apply the requested interval of that Society.

2.4.2 In-water survey

2.4.2.1 In-water survey of the ship’s bottom in lieu of every second Docking survey required in 2.4.1 may normally be carried out on ships:

\[ .1 \] For which company provides statement confirming that the ship’s bottom sustained no damages during the last period.

\[ .2 \] Where notation IWS has been assigned, except for the vessels in national navigation for which, instead of IWS notation, the Register considers acceptability of items 1., 4. and 5. of 2.4.2.2.

\[ .3 \] When the bottom survey is not held concurrently with Initial or Renewal survey of relevant certificate mentioned in 2.4.1.2.

\[ .4 \] Where the previous bottom survey was carried out in dock (except for passenger ships, see 2.4.1.5).

\[ .5 \] Where no recommendations/conditions exist requiring repair work to be carried out to the underwater part of the hull, rudder, propeller shaft or propeller.

NOTE: For ships older than 15 years (other than bulk carriers and tankers), performance of this survey is subjected to special consideration and approval of the Register. For tankers and bulk carriers of 15 years of age and over, inspection of the outside of the ship’s bottom is to be carried out with the ship in dry dock.

2.4.2.2 IWS notation may be assigned to a ship complying with the following requirements:

\[ .1 \] The underwater part of the hull is to be protected against corrosion, either by an appropriate coating system, and/or external cathodic protection, and is to be provided, where necessary, with permanent markings at selected points on the plating that would enable determining the diver’s position on the plating and localization of any damage.

\[ .2 \] Means are to be provided for ascertaining the clearance in the propeller shaft aft bearing, as well as the rudder pintle and bush clearances with the ship afloat.

\[ .3 \] Liners of rudder stocks and pintles as well as bushes in rudders are to be marked in

\[ \text{rules for the classification of ships} \]

\[ \text{PART 1 - CHAPTER 5} \]
such a way that the diver will notice any shifting or turning.

.4 Sea chests must be capable of being cleaned under water, where necessary. To this effect the closures of the strainers are to be so designed as to enable them to be opened and closed again, operationally safe, by the diver.

.5 All inlet and outlet openings below the deep water line must be capable of being blanked off for carrying out repairs and maintenance work.

.6 For other equipment, such as bow thrusters, or stabilizers, requirements will be specified separately in each particular case.

.7 Plans and information covering the aforementioned items shall be approved by the Register and placed onboard for facilitating the performance of the In-water Surveys.

2.4.2.3 The In-water survey is to provide information normally obtained from the Docking survey. 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 proposal for in-water survey which are to be submitted in advance of the survey so that satisfactory arrangements can be agreed with the Register.

2.4.2.4 Conditions and requirements for performing In-water Survey are specified in 6.3.

2.5 SURVEY OF PROPELLERS AND PROPELLER SHAFTS

2.5.1 For type and periodicity of surveys of propellers and propeller shafts see requirements stated in 10.

2.6 OTHER SURVEYS

2.6.1 Occasional surveys

2.6.1.1 Occasional survey is obligatory survey of the ship in the following cases:

.1 If the ship sustains accident, calamity or damage of such extent that it is presumed that the ability for navigation of the ship is endangered.

.2 When repairs or renewals of the hull, machinery installations and equipment are performed.

.3 When periodical surveys are delayed or postponed as prescribed by the Rules.

.4 On re-commissioning survey after the ship has been laid-up.

.5 When temporary changing navigation area or purpose of the ship.

.6 In the cases when occasional surveys are demanded by the Register as addition to the periodical surveys.

2.6.2 Voyage repairs and maintenance

2.6.2.1 Where repairs to hull, machinery installation 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 the Surveyor’s attendance during the voyage is to be submitted to and agreed upon by the Register reasonably in advance.

Failure to notify the Register, in advance of the repairs, may result in suspension of the ship’s class (see also the Rules, Part 1- General requirements, Ch. 1 – General information, 1.5.6).

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 Register for use in determining further survey requirements.

The above is not intended to include maintenance and overhaul to hull, machinery installation and equipment in accordance with manufacturer’s recommended procedures and established marine practice and which does not require the Register’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.
3 PREPARATIONS, CONDITIONS AND DOCUMENTATION FOR SURVEY

3.1 SURVEY PROGRAMME FOR SHIPS WITH AFFIXED ESP NOTATION

3.1.1 The Company in co-operation with the Register is to work out a specific Survey Programme for bulk carriers and tankers on which Enhanced Survey Programme is applied (ships with affixed ESP notation) prior to the commencement of any part of:
- the Renewal Survey, or
- the Intermediate Survey for vessels over 10 years of age.

The Survey Programme is to be in written format. The Survey Programme at Intermediate Survey may consist of the Survey Programme at the previous Renewal Survey supplemented by the Executive Hull Summary of that Renewal Survey and later relevant survey reports.

Prior to the development of the survey programme, the survey planning questionnaire is to be completed by the owner, and forwarded to the Register.

The Survey Programme at Intermediate Survey may consist of the Survey Programme at the previous Renewal Survey supplemented by the Executive Hull Summary of that Renewal Survey and later relevant survey reports.

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

3.1.2 The Survey Programme is to include the proposals for survey, including the means for providing access for Close-up survey, thickness measurement and tank testing and should take into account the information detailed in 3.3.

3.1.3 While developing the Survey Programme, in all cases, requirements concerning Close-up survey and thickness measurement stated in Tables 7.2.1-1, 7.2.1-3a, 7.7.4-1, 7.7.4-2, 7.7.2-1, 7.7.2-2, 7.7.2-3 and 7.2.2-1 are to be conducted as a minimum.

3.1.4 In developing the Survey Programme, the following documentation is to be collected and consulted with a view to selecting tanks, areas and structural elements to be examined:
- Survey status and basic ship information.
- Documentation on board (as described in 3.3).
- Main structural plans (scantlings drawings), including information regarding use of high tensile steels (HTS).
- Executive Hull Summary.
- Relevant previous damage and repair history.
- Relevant previous survey and inspection reports from both the Register and the Company.
- 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 notation), if any.
- Inspections by the Owner’s personnel during the last 3 years with reference to structural deterioration in general, leakage 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) and
- Any other information that will help identify suspect areas and critical structural areas.

3.1.5 The submitted Survey Programme is to account for and comply, as a minimum, with the requirements for Close-up survey, thickness measurement and tank testing, and is to include relevant information including at least:
- Basic ship information and particulars.
- Main structural plans (scantlings drawings), including information regarding use of high tensile steels (HTS).
- Plan of holds and tanks.
- List of holds and tanks with information on use, corrosion prevention and condition of coating.
- Conditions for survey (e.g. information regarding hold and tank cleaning, gas freeing, ventilation, lighting, etc.).
- Provisions and methods for access to structures.
- Equipment for surveys.
- Nomination of holds and tanks and areas for Close-up survey.
- Nominations of sections for thickness measurement.
- Nomination of tanks for tank testing.
- Damage experience related to the ship in question.

The Register will advise the Company of the maximum acceptable structural corrosion diminution levels applicable to the ship.

3.1.6 There are three basic types of possible failures to be considered in connection with development of a Survey Programme: corrosion, cracks and buckling. Contact damages, however, would not normally be covered by the program as indents are usually dealt with as a normal routine by Surveyors.

The development of a Survey Programme should in principle be as shown schematically in Figure 3.1-1. The approach is based on an evaluation of experience and knowledge basically related to:
.1 The structural design, where it should 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.

.2 Corrosion, related to the age of a ship, and is closely connected with the quality of the corrosion prevention system and subsequent maintenance during service life. Corrosion may also lead to cracking and/or buckling.

3.1.7 The various tanks, holds and spaces should be listed with the corrosion risks nominated accordingly. On the basis of the table of corrosion risk and the evaluation of design experience, the locations for initial Close-up survey and thickness measurement may be nominated.

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

For other requirements related to thickness measurement see 7.5.

3.1.9 The nomination for tanks, holds 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 should be that the extent is increased by age or where information is insufficient or unreliable.

For other requirements related to Close-up survey see 7.6.

3.1.10 However, these guidelines may not be used to reduce the requirements pertaining to thickness measurement and Close-up survey contained in 3.1.3, which are, in all cases, to be complied with as a minimum.

3.1.11 Survey meeting

3.1.11.1 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.

Prior to the commencement of any part of the Renewal and Intermediate Survey a survey 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 to ascertain that all the arrangements envisaged in the survey programme are in place, so as to ensure the safe and efficient conduct of the survey work to be carried out.

3.1.11.2 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/descaling, illumination, ventilation, personal safety);

.3 Extent of the thickness measurements;

.4 Acceptance criteria (refer to the list of minimum thickness’);

.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; and

.9 Communication between attending Surveyor(s) the thickness measurement firm operator(s) and owner representative(s) concerning findings.
Figure 3.1-1
Scheme of development of Survey Programme document
3.2 PREPARATIONS AND CONDITIONS FOR SURVEY – ALL SHIPS

3.2.1 The Company is to 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 Register and are to be in accordance with IACS PR 37.

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 Surveyors not to be adequate, the survey of the spaces involved is to not proceed.

NOTE: For additional requirements related to safety of Surveyors the following may be considered also (as far as applicable): IACS Recommendation 91 - "Guidelines for acceptance / approval of alternative means of access", IACS Recommendation 78 - "Safe use of portable ladders for close-up survey", IACS Recommendation 72 - "Confined space safe practice", EU Directive 2001/45/EC, amending Council Directive 89/655/EEC concerning the minimum safety and health requirements for the use of work equipment by workers at work.

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

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 Company need only to be cleaned and descaled to the extent necessary to determine the limits of areas to be renewed.

Sufficient illumination is to be provided to reveal corrosion, deformation, fractures, damages or other structural deterioration.

Where soft or semi-hard coating 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.

The establishment of proper preparation and the close co-operation between the attending surveyor(s) and the Company’s representatives onboard prior to and during the survey are an essential part in the safe and efficient conduct of the survey.

Applicable safety procedures and responsibilities shall be discussed and agreed to ensure that the survey is carried out under controlled conditions. Safety Meetings shall be held prior to entering the tank or space and regularly during the survey on board.

3.2.3 Casings, ceilings or linings, and loose insulation, where fitted, are to be removed, as required by the Surveyor, for examination of plating and framing. Compositions on plat-

ing are to be examined and sounded, but need not be disturbed if found adhering satisfactorily to the plating.

In refrigerated cargo spaces the condition of the coating behind the insulation is to be examined at representative locations. The examination may be limited to verification that the protective coating remains effective and that there are no visible structural defects. Where POOR coating condition is found, the examination is to be extended as deemed necessary by the Surveyor. The condition of the coating is to be reported. If indents, scratches, etc., are detected during surveys of shell plating from the outside, insulation’s in way are to be removed as required by the Surveyor, for further examination of the plating and adjacent frames.

3.2.4 For overall survey, means are to be provided to enable the Surveyor to examine the hull structure in a safe and practical way.

For close-up survey, in a cargo holds, cargo tanks and ballast tanks, one or more of the following means for access, acceptable to the Surveyor, is to be provided:

.1 Permanent staging and passages through structures.
.2 Temporary staging and passages through structure.
.3 Hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms.
.4 Boats or rafts.
.5 Portable ladders.
.6 Other equivalent means.

For close-up surveys of the cargo hold shell frames of bulk carriers less than 100.000 DWT, one or more of the following means for access, acceptable to the Surveyor, is to be provided:

.1 Permanent staging and passages through structures.
.2 Temporary staging and passages through structures.
.3 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.
.4 Hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms.
.5 Boats or rafts; provided the structural capacity of the hold is sufficient to withstand static loads at all levels of water.
.6 Other equivalent means.

For close-up surveys of the cargo hold shell frames of 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 Renewal Survey No. 1

.1 Permanent staging and passages through structures.
.2 Temporary staging and passages through structures.
.3 Hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms.
.4 Boats or rafts provided the structural capacity of the hold is sufficient to withstand static loads at all levels of water.

.5 Other equivalent means.

**Subsequent Intermediate Surveys and Renewal Surveys:**

.1 Either permanent or temporary staging and passage through structures for close-up survey of at least the upper part of hold frames.

.2 Hydraulic arm vehicles such as conventional cherry pickers for surveys of lower and middle part of shell frames as alternative to staging.

.3 Hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms.

.4 Boats or rafts provided the structural capacity of the hold is sufficient to withstand static loads at all levels of water.

.5 Other equivalent means.

Notwithstanding the above requirements, 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 3.2.4.1.b, and the "one other selected cargo hold" required in 3.2.4.2.b.

**3.2.5 Thickness measurements**

The thickness measurements are to be carried out by a qualified firm approved either by the Register, or by the recognised classification society (see also the Rules, Part 1- General requirements, Ch. 4 - Approval of manufacturers and service suppliers), except that in respect of measurements of non-ESP ships less than 500 GT, the Register may disregard some requirements of Rules, Part 1 – General requirements, Ch. 4 - Approval of manufacturers and service suppliers for approval of firms for such thickness measurements.

Thickness measurements required in context of hull structural surveys if not carried out by the Register are to be witnessed by a Surveyor. The attendance of the surveyor shall be recorded. This requires the Surveyor to be on board, while the gauging is taken, to the extent necessary to control the process. It is confirmed that this also applies to thickness measurements taken during voyages.

Prior to the commencement of any part of the survey a survey meeting is to be held between the attending Surveyor(s), the Company’s Representative in attendance and the TM firm representative so as to ensure the safe and efficient execution of the surveys and thickness measurements to be carried out onboard.

Requirements for the thickness measurement process are also defined in 7.5.

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.

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 are to be carried out simultaneously with close-up surveys.

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.

For structure built with a material other than steel, alternative thickness measurement requirements may be developed and applied as deemed necessary (see 7.2.4.1 for aluminium).

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

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 measurement 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.

**3.2.6 Thickness measurements Acceptance Criteria**

The acceptance criteria for thickness measurements are according to the Rules of the individual Classification Society and/or specific IACS URs depending on ship’s age and structural elements concerned, e.g. IACS UR S181 for corrugated transverse bulkhead, IACS UR S21A2 for all cargo hatch covers and coamings on exposed decks.

**NOTE:**

- UR S18 Revision 7 or subsequent revisions or corrigenda as applicable.
- UR S21A applies for ships contracted for construction on or after 1 July 2012, Rev.1 of UR S21A applies for ships contracted for construction on or after 1 July 2016.

**3.2.7 Remote Inspection Techniques (RIT)**

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 Register.

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.

When using a RIT as an alternative to close-up survey, if not carried out by the Register 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 Register.
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 Register is to be satisfied with the methods of orientation on the structure.

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.

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.

3.2.8 One or more of the following fracture detection procedures may be required if deemed necessary by the Surveyor:

- Radiographic equipment testing.
- Ultrasonic equipment testing.
- Magnetic particle equipment testing.
- Dye penetrant testing.

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.

Adequate and safe lighting is to be provided for the safe and efficient conduct of the survey.

Adequate protective clothing is to be made available and used during the survey (e.g. safety helmet, gloves, safety shoes, etc.).

3.2.9 Rescue and emergency response equipment

3.2.9.1 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.

3.2.10 Survey at sea or at anchorage

3.2.10.1 Survey at sea or at anchorage may be accepted if the Surveyor is provided with the necessary assistance from the personnel on board. Necessary precautions and procedures for carrying out the survey are to be in accordance with the following:

3.2.10.2 A communication system is to be arranged between the survey party in the tank and the responsible officer on deck. This system is also to include the personnel in charge of ballast pump handling if boats and rafts are used.

3.2.10.3 Surveys of tanks or applicable holds 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 under foreseeable conditions and provided the expected rise of water within the tank does not exceed 0.25 m.

3.2.10.4 When rafts or boats are used for close-up surveys, the following conditions are to be observed:

- only rough duty, inflatable rafts or boats, having satisfactory residual buoyancy and stability even if one chamber is ruptured, should be used;

3.2.10.5 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.

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

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

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

- access direct from the deck via a vertical ladder and a small platform fitted approximately 2 m below the deck in each bay; or

- access to deck from a longitudinal permanent platform having ladders to deck in each end of the tank. The platform shall, for the full length of the tank, be arranged in level with, or above, the maximum water level needed for rafting of under deck structure. For this purpose, the ullage corresponding to the maximum water level is to be assumed not more than 3 m from the deck plate measured at the midspan of deck transverses and in
Rules for the Classification of Ships

Part 1 - Chapter 5

The middle length of the tank (See Figure 3.2.8.6-1).

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

Figure 3.2.8.6-1

3.3 DOCUMENTATION

3.3.1 For ships built after 1st January 2007, with IMO number assigned, engaged in international voyages (ships having navigation area 1 to 4), the Company is to supply and maintain on board as-built construction drawings as listed below:

1. General arrangement,
2. Capacity plan,
3. Hydrostatic curves,
4. Loading manual, where required,
5. Midship section with scantling plan,
6. Decks,
7. Shell expansion,
8. Transverse bulkheads,
9. Rudder and rudder stock,
10. Cargo hatch covers, when applicable,
11. Bilge, ballast and cargo piping diagrams.

For all ships Company is to supply and maintain on board a Survey report file consisting of survey reports and thickness measurement reports (as applicable) for reference at future surveys.

3.3.2 For tankers and bulk carriers on which Enhanced Survey Programme is applied, the Company is to supply on board the following documentation:

1. A Survey report file, which is to be a part of documentation on board consisting of:
   a) reports of structural surveys,
   b) Executive Hull Summary,
   c) thickness measurement reports,

   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 the Register’s head office.

2. Supporting documents, i.e. additional documentation consisting of:
   a) Survey Programme (see 3.1) until such time as the Renewal survey or Inter-

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

3.2.10.7 On ships 20,000 tonnes DWT and above, subject to ESP, starting with Renewal survey No. 3 (commenced on or after 1 July 2001) at Renewal and Intermediate surveys, the survey of hull structure and piping systems is to be carried out by at least two exclusive Surveyors. On “capesize” bulk carriers of single side skin construction the intermediate hull classification survey between 10 and 15 years of age, the survey of hull structure and piping systems is to be performed by at least two exclusive Surveyors (definition of a “capesize” bulk carriers is 100,000 DWT and over). This requires that at least two exclusive Surveyors attend on board to jointly perform the required survey and to co-sign the survey report.

NOTE: It is confirmed that this also applies to voyage surveys.

On dual class vessels, the requirement for two Surveyors may be fulfilled by having one Surveyor attend from each society.

Though each attending Surveyor is not required to perform all aspects of the required survey, they are required to consult with each other and to do joint overall and close-up surveys to the extent necessary to determine the condition of the vessel areas. The extent of these surveys should be sufficient for the surveyors to agree on actions required to complete the survey with respect to renewals, repairs, and other recommendations or conditions of class. Each surveyor is required to co-sign the survey report or indicate their concurrence in an equivalent manner.

3.2.10.8 When the attending Surveyor realises that, for whatever reason, the survey requested cannot take place or cannot continue to the completion, the Head office is to be contacted for further communication with Company’s representative.
mediate Survey, as applicable, has been completed,
b) main structural plans of cargo holds, cargo and ballast tanks,
c) previous repair history,
d) cargo and ballast history,
e) inspections by ship’s personnel with reference to:
- structural deterioration in general,
- leakage in bulkheads and piping,
- condition of corrosion prevention system, if any,
f) extent of use of inert gas plant and tank cleaning procedures,
g) any other information that will help to identify suspect areas requiring inspection.

3.3.3 Prior to inspection, the Surveyor is to examine the completeness of the documentation on board and its contents as a basis for the survey.

3.3.4 The Company is to keep above mentioned documentation for the life time of the ship.

3.4 REQUIREMENTS FOR SAFE ENTRY TO CONFINED SPACES

3.4.1 All Surveyors have personal responsibility of safeguarding themselves and shall not enter spaces where the use of respiratory protection is required to do routine inspection.

3.4.2 All spaces covered by this policy shall, after initial testing, be re-tested at intervals not exceeding eight hours.

3.4.3 The Surveyor shall enter the above spaces only if accompanied by a person having responsibility for the work and watch is being maintained at the entry to the space, and the watch officer, or person-in-charge is to assure continuous communication with the Surveyor. Any welding, cutting, grinding, flattening and similar activity which may induce heat to the insulation is forbidden in the insulated spaces and adjacent insulated spaces, prior or during the entry for inspection of the space.

3.4.4 All spaces should be continuously forced ventilated during entry and immediately prior to entry for a sufficient period of time to produce a minimum of three air changes.

3.4.5 All cargo pipelines leading to or passing through space should as far as practicable be drained and flushed with water. Valves in all pipelines leading to the space should be securely closed and signposted.

3.4.6 The following spaces on board a ship or barge or other marine vessel shall not be entered unless they have been certified as “safe for workers” by a marine chemist, or by an industrial hygienist:

.1 Cargo spaces or other spaces containing or having contained bulk liquids, gases or solids of toxic, corrosive or irritant nature.
.2 Spaces immediately adjacent to before mentioned spaces.
.3 Compartments that have been sealed.

.4 Spaces that have been coated and closed.
.5 Freshly painted and unventilated compartments.
.6 Spaces containing cargoes that absorb oxygen (e.g. scrap iron, fruit, molasses, vegetable oils, etc.)
.7 Double bottoms.
.8 Spaces immediately adjacent to hot work spaces.

3.4.7 Spaces stated in 3.4.6.3 to 3.4.6.8 may be certified as “safe for workers” by other persons than those stated before (i.e. marine chemist or industrial hygienist). The Company in this case may authorise another person who has been trained in the hazards of confined spaces and is knowledgeable about the equipment and procedures for ascertaining that a confined space is safe for entry.

3.4.8 Detailed requirements for safe entry to confined spaces are stated in the guidelines of the Register and are to be in accordance with IACS PR 37.
4 ANNUAL SURVEY

4.1 GENERAL

4.1.1 Annual classification surveys are to be held concurrently with statutory Annual surveys or other relevant statutory surveys, wherever practicable.

4.1.2 At Annual classification surveys the Surveyor is to examine the hull, hull equipment, machinery and electrical devices, and the fire protection arrangements, so far as necessary and practicable in order to be satisfied as to their general condition. The survey of hull 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. The Surveyor is also to report evidence of possible safety management failures recorded during Annual classification surveys.

From 1st January 2011, for all ships, new installation of materials which contain asbestos is prohibited. In the context of this regulation, new installation of materials containing asbestos means any new physical installation on board. Any such material purchased prior to 1st January 2011 being kept in the ship’s store, is not permitted to be installed on board. For additional reference see the Rules, Part 1 – General requirements, Ch. 2 – Survey during construction and initial survey, 1.1.

4.2 HULL AND HULL EQUIPMENT SURVEY - STEEL SHIPS, ALUMINIUM ALLOY SHIPS - ALL SHIPS

4.2.1 General requirements

4.2.1.1 The Surveyor is to confirm that the stability and where applicable loading and ballasting information are on board. Electronic loading instrument where required is to be checked according to test examples as stated in operation manual.

4.2.1.2 The Surveyor is to check that no alternations have been made to the hull or superstructures that would affect the position of the load line.

4.2.1.3 The Surveyor is to be satisfied as to the efficient condition of the following:

1. All openings on the ship’s side below the freeboard deck and their closing appliances including bow, side and stern doors.
2. Weather deck plating, superstructure end bulkheads, deck houses and the openings therein together with all closing appliances.
3. Hatchways on freeboard and superstructure decks, exposed casings and skylights together with closing appliances.
4. Ventilator coamings and air pipes including closing appliances and flame screens.
5. Vent ducts, exits from machinery and boiler spaces including closing appliances and flame screens.

6. Side scuttles, deadlights and windows with their means of closure.
7. Scuppers and sanitary discharges, valves on discharge lines and their controls and inlets (so far as it is practicable).
8. Bulwarks, freeing ports, and shutters arrangement if applicable.
9. Guardrails, gangways, walkways and other means provided for the protection of the crew’s quarters working spaces.
10. Fittings and appliances for timber deck cargoes.
11. Freeboard marks.

4.2.1.4 Anchoring and mooring equipment is to be examined so far as it is practicable.

4.2.1.5 The collision and other watertight bulkheads including watertight bulkhead penetrations are to be examined together with an examination and testing (locally and remotely) of the watertight doors in watertight bulkheads, as far as accessible and practicable.

4.2.1.6 Main and auxiliary steering arrangements are to be examined and tested in operation, including their associated equipment and control systems, together with alarms and recharging arrangements for hydraulic power operated steering gears.

4.2.1.7 In addition to above mentioned the following is to be carried out:

1. Suspect areas identified at previous surveys are to be examined.
2. Thickness measurements are to be taken of the areas of substantial corrosion (identified at previous surveys) and the extent of thickness measurements is to be increased to determine areas of substantial corrosion. Table 7.2.1-3a 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.

NOTE: These requirements are not applicable to cargo tanks of oil tankers, chemical tankers and double hull oil tankers.

3. Examination of ballast tanks when required as a consequence of the results of the Renewal 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. Table 7.2.1-3a 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.
4.2.2 Examination of weather decks, ship side plating above water line, hatch covers and coamings

4.2.2.1 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.

4.2.2.2 Where mechanically operated steel covers are fitted, checking the satisfactory condition of:

1. Hatch covers, including close-up survey of hatch covers.
2. Tightness devices of longitudinal, transverse and intermediate cross junctions (gaskets, gasket lips, compression bars, drainage channels).
3. Clamping devices, retaining bars, cleating, chain or rope pulleys.
4. Guides, guide rails and track wheels.
5. Stoppers etc.,
7. Hydraulic system essential to closing and securing, safety locks and retaining devices.

4.2.2.3 Where portable covers, wooden or steel pontoons are fitted, checking the satisfactory condition where applicable of:

1. Wooden covers and portable beams, carriers or sockets for the portable beam, and their securing devices, steel pontoons, tarpsaulins.
2. Cleats, battens and wedges.
3. Hatch securing bars and their securing devices, loading pads/bars and the side plate edge.
4. Guide plates and chocks, compression bars, drainage channels and drain pipes (if any).

4.2.2.4 Checking the satisfactory condition of hatch coaming plating and their stiffeners, where applicable.

4.2.2.5 Random checking of the satisfactory operation of mechanically operated hatch covers is to be performed including:

1. Stowage and securing in open condition.
2. Proper fit, locking and efficiency of sealing in closed condition.
3. Operational testing of hydraulic and power components, wires, chains and link drives.

4.2.2.6 The watertightness of hatch covers shall be checked by hose testing or another suitable means (chalk marking, testing with ultrasonic equipment) if considered necessary by the Surveyor.

4.2.2.7 Following is to be carried out:

1. Examination of the weld connection between air pipes and deck plating.
2. External examination of all air pipe heads installed on the exposed decks.
3. Examination of flame screens on vents to all bunker tanks.

4 Examination of ventilators, including closing devices, if any.

4.2.3 Bow doors, inner doors, side shell doors and stern doors on Ro-Ro passenger ships

Requirements for surveys of bow doors, inner doors, side shell doors and stern doors on Ro-Ro passenger ships are stated in 4.14.1.1.

4.2.4 Additional requirements regarding hull repairs - all self-propelled ships

4.2.4.1 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 ship’s structural, watertight or weathertight integrity, is to be promptly and thoroughly repaired. Areas to be considered include:

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

For bulk carriers only, following additional areas to be considered:

- inner bottom structure and inner bottom plating;
- inner side structure and inner side plating.

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

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

4.2.4.4 Where the damage found on structure mentioned in 4.2.4.1 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 weather tight integrity and impose a Condition of Class with a specific time limit.
4.3 HULL AND HULL EQUIPMENT SURVEY - WOODEN SHIPS, FIBER REINFORCED PLASTIC SHIPS - ALL SHIPS

4.3.1 Annual survey is to be carried out in order to verify that the hull and its equipment are in satisfactory and efficient condition, and that no unapproved alternations have been made. The following are to be dealt with so far as is practicable:

1. Freeboard marks are to be checked.
2. The outside shell above the water-line is to be examined, with particular attention to the butts of sheerstrake and shell planking.
3. Weather decks are to be examined with particular attention to the butts of waterways, inner waterways and planking.
4. Hatchways and cargo hatch covers including closing and securing appliances (see also 4.2.2, if applicable) as well as other deck openings with closing appliances.
5. Guard rails, bulwarks, freeing ports, mooring equipment and other deck fittings are to be examined.
6. Masts and rigging (steady and loose gear) including lightning conductors are to be examined.
7. Towline, hawsers and warps, and stream anchor, wire rope (or chain) if required is to be examined.
8. The windlass is to be examined externally and in working condition.
9. It is to be verified that the equipment of anchors and chain cables is complete, and chain cables are to be examined as far as accessible.
10. Main and auxiliary steering arrangements are to be checked, with particular attention to the rod and chain gear if fitted.
11. The deck outfit, tools and gear are to be verified.
12. Enclosed spaces, as far as accessible at the time of the survey are to be examined.
13. Portions of the inner planking and ceiling are to be removed for detailed examination and testing of timbers by axe, chisel or other suitable tool if considered necessary by the Surveyor.
14. For fiber-reinforced plastic ships survey of the connection between hull and superstructure is to be carried out, particularly when hull and superstructure are not built from the same material. Additionally, the hull survey is to be performed by sound pattern hammer testing.

4.4 MACHINERY, ELECTRICAL EQUIPMENT AND FIRE PROTECTION - ALL SHIPS

4.4.1 Machinery and electrical equipment

4.4.1.1 General examination of machinery and boiler spaces is to be carried out with particular regard to the main propulsion system, auxiliary machinery arrangements and piping systems used for essential services on board (in particular insulation and gauges), main shafting, main and auxiliary boilers and pressure vessels with their fittings, safety and control devices and piping systems. Particular attention is to be given to the existence of any danger to persons on board due to moving parts, hot surfaces as well as fire and explosion hazards.

4.4.1.2 It is to be confirmed that the engine room telegraph, the second means of communication between the navigation bridge and the machinery space and the means of communication with any other positions from which the engines are controlled are operated satisfactorily. Also, it is to be confirmed that the means of communication between the navigation bridge and steering gear (or alternative steering position if fitted) are operating satisfactorily.

4.4.1.3 The bilge pumping systems and bilge wells, including operation of extended spindles and level alarms, where fitted, are to be examined so far as practicable. All bilge pumps are to be tested under operating conditions.

4.4.1.4 The means for the operation of the main and auxiliary machinery essential for propulsion and the safety of the ship are to be examined including, when applicable, the means of remotely controlling the propulsion machinery from the navigating bridge and the arrangements to operate the main and other machinery from a machinery control room.

4.4.1.5 Electrical equipment and installations including main and emergency sources of power, switchboards, switch-gears, cables and circuit protective devices and earth bounding straps are to be examined under operating conditions so far as is applicable. Automatic starting of emergency sources of power, where provided, is to be checked.

4.4.1.6 It is to be examined that the precautions against shock, fire and other hazards of electrical origin are being maintained.

4.4.1.7 For periodically unattended machinery spaces a general examination of automation equipment is to be carried out, and operation of safety devices and control systems is to be checked. Also it is to be confirmed that the engineer’s alarm is clearly audible in the engineer’s accommodation.

For ships built after 1st July 2002 with class notation AUT 1, at annual classification surveys Surveyor is to examine and verify approved “Maintenance and testing program for automation system”.

The plan for systematic maintenance and function testing is to show in detail how components and systems...
affecting main functions. Columns showing test dates and verification of tests carried out are to be included.

The longest intervals for functional alarms testing are not to surpass 12 months and for critical alarms not to exceed 6-month intervals.

4.4.1.8 It is to be confirmed that the normal operation of the propulsion machinery can be sustained or restored even though one of the essential auxiliaries become inoperative, and, that means are provided, so that the machinery can be brought into operation from the dead ship condition without external aid.

4.4.1.9 Emergency escape routes from machinery and boiler spaces as well as from accommodation and other spaces are to be checked to ensure that they are free of obstruction.

4.4.2 Fire protection

4.4.2.1 It is to be checked that following Plans and Manuals for fire protection systems and firefighting systems and appliances are available on board:

- Maintenance plan.
- Training manual.
- Fire safety operational booklet.

It is to be confirmed as far as practicable that no changes have been made in the structural fire protection. Also, verification of the operation of manual and/or automatic fire doors where fitted, and testing of the means of closing the main inlets and outlets of all ventilation systems from outside the space served is to be carried out.

4.4.2.2 Any fire detection and alarm system is to be examined as far as possible and tested as feasible (particularly in machinery and cargo spaces).

4.4.2.3 The fire pumps, fire main, hydrants, hoses and nozzles, and the international shore connection are to be examined and tested for operation (at least 20% of the available fire hoses and nozzles are to be included in the testing of the fire main system). It is to be checked that each fire pump, including the emergency fire pump can be operated separately, so that two jets of water are produced simultaneously from different hydrants at any part of the ship whilst the required pressure is maintained in the fire main. Also, where fitted, sprinkler system connections from the ship’s fire main, are to be tested for operation.

4.4.2.4 All portable and semi-portable fire extinguishers are to be checked for proper location, charging pressure and condition, and evidence of discharged containers. Service intervals are also to be checked (Servicing is to be carried out at intervals not exceeding 12 months by an approved service station).

NOTE: Annual inspection/maintenance is to be carried out by competent person/ship’s responsible safety officer, in accordance with manufacturer’s instructions.

It is to be confirmed that the firemen’s outfits and emergency escape breathing devices – EEBD’s are complete and in good condition, and that the cylinders, including the spare cylinders, of any required self-contained breathing apparatus are suitably charged.

NOTE: It is recommended that intervals for hydraulic pressure testing of breathing apparatus air cylinders do not exceed 5 years. Any additional requirements from National Authorities will prevail.

4.4.2.5 The fixed fire protection arrangements in machinery spaces including fixed local application fire extinguishing system and cargo spaces (if fitted) are to be examined. It is also to be confirmed that fire main valves are distinguishably marked and that places from which fire system is controlled are supplied with instructions for use. Air should be blown through the piping of extinguishing gas systems.

CO₂ and Halon bottles of fixed firefighting systems are subject to crew’s monthly and annual inspections in accordance with manufacturer’s instructions and safety precautions. The records of fixed fire extinguishing system inspections kept onboard according to maintenance and inspection plan are to be examined.

4.4.2.6 The fixed fire protection arrangements in cargo spaces are to be examined and the operation of the means of control provided for closing the various openings is to be confirmed so far as is practicable and as appropriate.

4.4.2.7 The operation of the remote means of control provided for the opening and closing of the skylights, the release of smoke, the closure of the funnel and ventilation openings, and the closure of power operated and other doors, is to be examined.

4.4.2.8 It is to be examined so far as practicable the remote control for stopping of ventilation and boiler forced and induced draft fans, and the stopping of oil fuel and other pumps that can discharge flammable liquids.

4.4.2.9 The arrangements for oil fuel, lubrication oil and other flammable oils are to be examined, including so far as practicable and as appropriate the operation of the remote means of closing the valves on the tanks that contain oil fuel, lubrication oil and other flammable oils.

4.4.2.10 Fixed fire extinguishing systems are subject to maintenance by approved service firms every two years.

4.4.2.11 Where fixed foam fire extinguishing system is used, report on foam concentrates from foam manufacturer or independent laboratory is to be checked (foam concentrates should be subjected to periodical control after the period of three years after filling into the system, and after that every year).

4.4.2.12 The arrangements for storage, distribution and usage of gaseous fuel for domestic purposes are to be examined.

Examining the fire extinguishing arrangements for spaces containing paint.

Examining precautions against fire hazards in accommodation and domestic spaces including examination of exhaust ducts from galley ranges and deep fat cooking equipment. Testing the work of thermostat alarm and checking, where fitted, work of automatic fire-extinguishing system of deep-fat cooking equipment installed on ships after 1st July 2002.
PART 1 - CHAPTER 5

4.5 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR OIL TANKERS WITH AFFIXED ESP NOTATION OTHER THAN DOUBLE HULL OIL TANKERS

4.5.1 Examinations according to the requirements stated in 4.2 and 4.4 are to be carried out as appropriate.

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.

4.5.2 It is to be confirmed, where appropriate, that the requisite arrangements to regain steering capability in the event of single failure in its piping system or in one of the power units are being maintained.

4.5.3 Cargo tank openings are to be examined including gaskets, covers coamings and screens.

4.5.4 Cargo pressure/vacuum valves and devices to prevent the passage of flame are to be examined so far as practicable.

4.5.5 Flame screens on vents to all bunker tanks, and void spaces are to be examined so far as is practicable.

4.5.6 Cargo tank venting, cargo tank purging and gas freeing systems are to be examined including flame arrestors and pressure/vacuum valves as applicable above the upper deck within the cargo tank area, also including vent masts and headers.

4.5.7 Cargo, crude oil washing, ballast and stripping systems, both on deck and in the cargo pump rooms and the bunker system on deck are to be examined.

4.5.8 It is to be confirmed that no potential sources of ignition such as loose gear, combustible materials, excessive products in the bilges, etc. are present in or near the cargo pump room, and that access ladders are in good condition.

4.5.9 All pump room bulkheads are to be examined for signs of oil leakage or fractures and, in particular, the sealing arrangements of all penetrations in cargo pump room bulkheads are to be checked.

4.5.10 It is to be confirmed that the pump room ventilation system is operational, ducting intact, dampers operational and screens are clean.

4.5.11 It is to be confirmed that all electrical equipment in dangerous zones is suitable for such locations, is in good condition and is being properly maintained.

4.5.12 Cargo, bilge, ballast and stripping pumps are to be examined so far as is practicable for undue gland seal leakage.

        Proper operation of electrical and mechanical remote operating and shutdown devices, and operation of cargo pump room bilge system, is to be confirmed, and it is to be checked that pump foundations are intact.

4.5.13 It is to be confirmed that installed pressure gauges on cargo discharge lines and level indicator systems are operational.

4.5.14 The emergency towing arrangements (on tankers for oil and chemical tankers with DWT ≥ 20,000) is to be examined to ensure ready availability.

4.5.15 It is to be confirmed that:

        .1 Secondary means of allowing full flow relief of vapours, air or inert gas to prevent over/under pressure of tanks in the event of failure of the primary gas pressure/vacuum relief system is provided, or alternatively, pressure sensors are fitted in the tank, monitored in the cargo control room, and provided with an alarm activated in the event of over/under pressure.

        .2 Any stop valves or other means provided to isolate cargo tanks have clear indication of their operational status and where tanks have been isolated means are provided to ensure the valves are opened before any cargo or ballasting operations commence.

        .3 If cargo or ballasting operations are intended for a tank or group of tanks which are isolated from the common venting system, such tanks have means of preventing over or under pressure.

4.5.16 Piping and cut-out valves of cargo tank and cargo pump room fixed fire-fighting system are to be examined.

4.5.17 In addition to the requirements stated in 4.4.2, the deck foam system, including the supplies of foam concentrate and testing that the minimum number of jets of water at the required pressure in the fire main is obtained, are to be checked, when the system is in operation. Fire-fighting arrangements in the pump room are to be checked.

4.5.18 Condition of all piping systems in the cargo pump room is to be examined so far as practicable.

4.5.19 It is to be confirmed, so far as practicable, that the crude oil washing system remains satisfactory and in particular:

        .1 The crude oil washing piping, pumps, valves and deck mounted washing machines are to be examined externally for signs of leakage and is to be checked that all anchoring devices for crude oil washing piping are intact and secure.

        .2 In those cases where drive units are not integral with the tank cleaning machines it is to be confirmed that the number of operational drive units as specified in the Operations and Equipment Manual are on board.

        .3 It is to be checked that, when fitted, steam heaters for water washing can be properly isolated during crude oil washing operations, either by double shut-off valves or clearly identifiable blanks.

        .4 It is to be checked that the prescribed means of communication between the deck watchkeeper and the cargo control position is operational.
.5 It is to be confirmed that an overpressure relief device (or other approved arrangement) is fitted to the pumps supplying the crude oil washing systems.

.6 It is to be confirmed that flexible hoses for supply of oil to the washing machines on combination carriers, are of an approved type, are properly stored and are in good condition.

.7 Tanks containing departure and/or arrival ballast water are to be checked, so far as is practicable, to confirm the effectiveness of the cleaning and stripping.

.8 It is to be checked, as far as practicable, that the crude oil washing machines are operable, and, when the survey is carried out during crude oil washing operations, observing the proper operation of the washing machines by means of the movement indicators and/or sound patterns or other approved methods is to be carried out.

.9 The effectiveness of the stripping system in appropriate cargo tanks is to be checked so far as practicable by observing the monitoring equipment and by hand-dipping or other approved means.

4.5.20 Examination of ballast tanks where required as a consequence of the results of the Renewal survey or 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. 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 7.7.2-2. 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.

4.6 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR BULK CARRIERS WITH AFFIXED ESP NOTATION

4.6.1 For bulk carriers, examination of bunker and vent piping systems, including ventilators is to be carried out.

The requirements of Annex C1 are to be complied with as applicable.

4.7 ANNUAL SURVEY REQUIREMENTS FOR CHEMICAL TANKERS

4.7.1 Examinations according to the requirements stated in 4.2, 4.4 and 4.5 are to be fulfilled as far as applicable (for chemical tankers with affixed ESP notation see also Annex A).

4.7.2 Gauging devices, high level alarms and valves associated with overflow control are to be examined.

4.7.3 Cargo heating/cooling system sampling arrangements are to be examined where fitted, and satisfactory condition of any devices provided for measuring the temperature of the cargo, and any associated alarms is to be confirmed.

4.7.4 Wheelhouse doors and windows, side scuttles and windows in superstructure and deckhouse ends facing the cargo area are to be in good condition.

4.7.5 It is to be confirmed that pumps, valves and pipelines are identified and distinctively marked.

4.7.6 It is to be confirmed that the remote operation of the cargo pump room bilge system is satisfactory.

4.7.7 Cargo transfer arrangements are to be examined and it is to be confirmed that any hoses are suitable for their intended purpose.

4.7.8 It is to be confirmed that the condition of the portable fire extinguishing equipment for the cargoes to be carried in the cargo area is satisfactory.

4.7.9 It is to be confirmed that arrangements are made for sufficient gas to be carried or generated to compensate for normal losses and that the means provided for monitoring ullage spaces are satisfactory.

4.7.10 It is to be confirmed that arrangements are made for sufficient medium to be carried where drying agents are used on air inlets to cargo tanks.

4.7.11 It is to be confirmed, when applicable, that the bow or stern loading and unloading arrangements are in order, and testing of the means for communication and the remote shut down for the cargo pumps is to be carried out.

4.7.12 The equipment for personal protection is to be examined and in particular it is to be confirmed that:

.1 The protective clothing for crew engaged in loading and discharging operations and its stowage is in satisfactory condition.

.2 The required safety equipment and associated breathing apparatus and associated air supplies and, when appropriate, emergency escape respiratory and eye protection are in a satisfactory condition and are properly stowed.

.3 Medical first aid equipment, including stretchers and oxygen resuscitation equipment are in satisfactory condition.

.4 Arrangements have been made for the antidotes for the cargoes actually carried to be on board.

.5 Decontamination arrangements and eyewashes are operational.

.6 The required gas detection instruments are on board and that arrangements have been made for the supply of the appropriate vapour detection tubes.

.7 The arrangements for the stowage of cargo samples are satisfactory.

4.7.13 It is to be confirmed that removable pipe lengths or other approved equipment necessary for cargo separation
are available in the pump room and are in satisfactory condition.

4.7.14 It is confirmed that there are no signs of undue leakage in cargo pump room and that rescue arrangements (access ladders) are in satisfactory condition.

4.7.15 The arrangements for the ventilation of spaces normally entered during cargo handling operations and other spaces in the cargo area are to be examined so far as is practicable and confirmed their satisfactory operation.

4.7.16 It is to be confirmed, so far as is practicable, that the intrinsically safe systems and circuits used for measurement, monitoring, control and communication purposes in all hazardous locations are being properly maintained.

4.7.17 The tank washing piping is to be examined externally and it is to be confirmed that the type, capacity, number and arrangement of the tank washing machines are as approved.

4.7.18 The wash water heating system is to be examined externally.

4.7.19 The underwater discharge arrangements are to be examined externally so far as practicable.

4.7.20 It is to be confirmed that the means of controlling the rate of discharge of the residue is as approved.

4.7.21 It is to be confirmed that the ventilation equipment for residue removal is as approved.

4.7.22 The heating system required for solidifying and high viscosity substances is to be externally examined so far as it is accessible.

4.7.23 It is to be confirmed that any cargo tank high level alarms are operable.

4.7.24 It is to be confirmed that information relating to the chemical and physical of the products to be carried has been provided, as well as a manual covering procedures for cargo transfer, tank cleaning, gas freeing, ballasting, etc.

4.8 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR SHIPS WITH INERT GAS SYSTEM FITTED

4.8.1 It is to be externally examined the condition of piping and components including vent piping above the upper deck in the cargo tank area and overboard discharges through the shell so far as practicable, for signs of corrosion or gas/effluent leakage.

4.8.2 The proper operation of both inert gas blowers is to be confirmed.

4.8.3 The operation of the scrubber room ventilation system is to be checked.

4.8.4 The deck water seal is to be checked for automatic filling and draining, together with the operation of the non-return valve.

4.8.5 The operation of all remotely operated and automatically controlled valves and in particular, the flue gas isolating valves are to be examined.

4.8.6 The interlocking features of soot blowers are to be tested.

4.8.7 It is to be checked that the gas pressure regulating valve automatically closes when the inert gas blowers are secured.

4.8.8 The following alarms and safety devices of the inert gas system are to be checked so far as practicable and using simulated conditions where necessary:

   .1 High oxygen content of gas in the inert gas main.
   .2 Low gas pressure in the inert gas main.
   .3 High water level in the scrubber.
   .4 Failure of the inert gas blowers.
   .5 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.
   .6 Low pressure in the supply to the deck water seal.
   .7 High temperature of gas in the inert gas main.
   .8 High pressure of gas in the inert gas main.
   .9 Low water pressure or low water flow rate.
   .10 Accuracy of portable and fixed oxygen measuring equipment by means of calibration gas.

4.8.9 Examining the fixed fire-fighting system for the cargo pump rooms and confirming as far as practicable and when appropriate the operation of the remote means for closing the various openings.

Checking if there are available on board at least two portable instruments for measuring flammable vapour concentrations together with any necessary spares and means of calibration.

4.8.10 The proper operation of the inert gas system is to be checked, when practicable on completion of the checks listed above.

4.9 ANNUAL SURVEY REQUIREMENTS FOR FLOATING UNITS

4.9.1 During Annual survey of floating unit the following is to be confirmed, as far as can be seen and when appropriate:

   .1 That no unapproved alternations have been made to the hull or superstructures.
   .2 That the cargo is stowed and secured in accordance with the approved documentation.
   .3 That anchoring and mooring equipment as well as anchoring and mooring of floating unit is in accordance with the approved documentation.
4.9.2 For the hull and hull equipment the Annual survey consists of the provisions of 4.2 (or 4.3) as appropriate.

4.9.3 For the machinery and electrical installations as well as the fire protection arrangements the Annual survey consists of the provisions of 4.4 as appropriate.

4.9.4 When Annual survey of floating dock is to be carried out, then, in addition to aforementioned the equipment required for operation of the dock, e.g. bilge and keel blocks, their drives, bridge to deck and shore communications and shore connections are to be examined.

4.9.5 During Annual survey of floating unit it is also recommended survey on Continuous basis to be applied concurrently (see 2.3.1), except when another agreement is made between the Company and the Register. When survey on Continuous basis has been applied than in addition to Annual survey requirements, 10 to 20 % of items covered by the Renewal survey are to be examined.

4.10 ADDITIONAL ANNUAL SURVEY REQUIREMENTS AFTER DETERMINING COMPLIANCE WITH SOLAS 74, CH. II-1/25, FOR GENERAL CARGO SHIPS WITH SINGLE HOLD

4.10.1 For ships less than 80 meters in length, or for ships built before 1 July 1998 less than 100 meters in length, with single hold not protected by double hull, 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.

4.11 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR GENERAL DRY CARGO SHIPS

4.11.1 Examinations according to the requirements stated in 4.2 and 4.4 are to be fulfilled as far as applicable.

4.11.2 In addition to above mentioned the following is to be carried out:

.1 Suspect Areas identified at previous Renewal Surveys are to be overall and close-up surveyed. Thickness measurements are to be taken of the area of substantial corrosion and the number of thickness measurements is to be increased to determine the extent of substantial corrosion. Table 7.2.1-3a 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.

.2 For ships 10-15 years of age:
   a) Overall survey of one forward and one after cargo hold and their associated 'tween deck spaces.
   b) 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 number of thickness measurements is to be increased to determine the extent of substantial corrosion. Table 7.2.1-3a 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.
   c) 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 number of thickness measurements is to be increased to determine the extent of substantial corrosion. Table 7.2.1-3a 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.
   d) Where the protective coating in cargo holds, as defined in 1.2.10 is found to be in GOOD condition, the extent of Close-up surveys and thickness measurements may be specially considered (see 1.2.13).
   e) All piping and penetrations in cargo holds, including overboard piping, are to be examined.
   .4 Examination of ballast tanks:
      a) Examination of ballast tanks when required as a consequence of the results of the Renewal survey or Intermediate survey. 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 number of thickness measurements is to be increased to determine the extent of substantial corrosion. Table 7.2.1-3a 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.

### 4.12 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR LIVE-STOCK CARRIERS

**4.12.1**
The survey is to include a general examination of:

1. spaces for the live-stock and related hatch covers (to be surveyed according to 4.2.2);
2. ventilation means, including prime movers;
3. main, emergency and portable lighting systems in live-stock spaces, passageways and access routes;
4. the drainage system;
5. fodder and fresh water systems;
6. fire-fighting appliances, with working test as far as necessary and practicable (according to 4.4.2);
7. means of escape, with confirmation they are kept clear.

### 4.13 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR FAST VESSELS

**4.13.1** **High speed craft**
Inspection of the structure, machinery safety equipment radio installations any stabilisation systems, air cushion systems and other equipment is to be carried out as far as applicable, to ensure that they are in satisfactory condition and are fit for the service for which the craft is intended and, that no unapproved changes have been made to structure, equipment, fittings, arrangements and materials covered by the survey.

The survey includes as far as applicable the following:

1. inspection of the outside of the craft bottom in accordance with the requirements stated in 6 with particular attention given to hull appendages (hydrofoils, hydrofoil supports, skirt fixations, shaft brackets, etc.) and to their fixation to the hull and, to the condition of the corrosion protection system of the structure,
2. inspection of the hull and machinery in accordance with 4.2 and 4.4.

**4.13.2** **Dynamically supported craft and Fast craft**
Every year the survey in accordance with 4.13.1 is to be carried out as far as applicable.

### 4.14 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR RO-RO CARGO SHIPS, PASSENGER SHIPS, RO-RO PASSENGER SHIPS

Following requirements apply to type notations *ro-ro cargo ship*, *passenger ship*, *ro-ro passenger ships*. Examinations according to the requirements stated in 4.2 and 4.4 are to be fulfilled as far as applicable.

#### 4.14.1 Ro-Ro cargo ships

**4.14.1.1 Shell and inner doors**

.1 The requirements of this item apply to all bow, inner, side shell and stern doors fitted on ships which utilize a loading ramp to enable wheeled vehicles to be rolled-on and rolled of the ship.

.2 For the scope of survey of shell and inner doors, the following definitions are applicable:
   - securing device: a device used to keep the door closed by preventing it from rotating about its hinges,
   - supporting device: a device used to transmit external or internal loads from the door to a securing device and from the securing device to the ship’s structure, or a device other than a securing device, such as a hinge, stopper or other fixed device, that transmits loads from the door to the ship’s structure,
   - locking device: a device that locks a securing device in the closed position.

.3 It is to be verified that an approved copy of The Operating and Maintenance Manual (OMM) is on board and any possible modifications are included,

.4 Bow inner, side shell and stern doors are to be structurally examined with particular attention paid to:
   - structural arrangement of doors including plating, secondary stiffeners, primary structure, hinging arms and welding,
   - shell structure surrounding the opening of the doors and the securing, supporting and locking devices including shell plating, secondary stiffeners, primary structure, and welding,
   - hinges and bearings, thrust bearings,
   - hull and door side supports for securing, supporting and locking devices.
A close-up survey of securing, supporting and locking devices, including welding is to be carried out for:
- cylinder securing pins, supporting brackets, back-up brackets (where fitted) and their welded connections,
- hinge pins, supporting brackets, back-up brackets (where fitted) and their welded connections,
- locking hooks, securing pins, supporting brackets, back-up brackets (where fitted) and their welded connections,
- locking pins, supporting brackets, back-up brackets (where fitted) and their welded connections,
- locating and stopper devices and their welded connections.
Whenever a crack is found, during structural examination or close-up survey, an examination with Non-destructive test is to be carried out in the surrounding area and for similar items as considered necessary by the surveyor.
Clearances of hinges, bearings and thrust bearings are to be taken, where no dismantling is required. Where the function test is not satisfactory, dismantling may be required to measure the clearances. If dismantling is carried out, a visual examination of hinge pins and bearings together with NDT of the hinge pin is to be carried out. Clearances of securing, supporting and locking devices are to be measured, where indicated in the OMM.
An examination of sealing arrangements (packing material / rubber gaskets and retaining bars or channels including welding) is to be carried out.
The drainage arrangements including bilge wells, drain pipes and non-return valves are to be examined. A test of the bilge system between the inner and outer doors is to be carried out.
Function tests of doors - checking of the satisfactory operation of the bow, inner, side shell and stern doors during a complete opening and closing operation is to be made, as applicable, including:
- proper working of hinging arms and hinges,
- proper engagement of the thrust bearings,
- proper working of devices for locking the door in open position are to be checked,
- securing, supporting and locking devices,
- proper sequence of the interlock system for the opening / closing system and the securing and locking devices,
- mechanical lock of the securing devices,
- proper locking of hydraulic securing devices in the event of a loss of the hydraulic fluid, according to the procedure provided by the OMM,
- correct indication of open / closed position of doors and securing / locking devices at navigation bridge and other control stations,
- isolation of the hydraulic securing / locking devices from other hydraulic systems,
- confirmation that the operating panels are inaccessible to unauthorised persons,
- verification that a notice plate giving instructions to the effect that all securing devices are to be closed and locked before leaving harbour is placed at each operating panel and supplemented by warning indicator lights,
- examination of electrical equipment for opening, closing and securing the doors.
Function test of the indicator system - checking of the satisfactory operation of the indicator system, where fitted, is to be carried out, as applicable, including:
- proper visible indication and audible alarm on the navigation bridge panel, according to the selected function "harbour / sea voyage" and on the operating panel,
- lamp test function on both panels,
- verification that it is not possible to turn off the indicator light on both panels,
- verification of fail-safe performance, according to the procedure provided by the OMM,
- confirmation that power supply for indicator system is supplied by the emergency source or other secure power supply and independent of the power supply for operating the doors,
- proper condition of sensors and protection from water, ice formation and mechanical damage.
A hose test or equivalent is to be carried out. If the visual examination and function test have shown satisfactory results, the tightness test of shell doors on Ro-Ro cargo ships need not be carried out unless
considered necessary by the attending surveyor.

13 NDT and Thickness Measurements
When considered necessary by the surveyor, NDT and thickness measurements may be required after visual examination and function test.

4.14.1.2 Internal platforms and ramps
.1 The annual survey of internal movable platforms and ramps (excluding those considered as inner doors and covered in 4.14.1.1 and related equipment consists of:
- a general examination of the installation, particular attention being paid to the condition of steel cables;
- conformation of the proper operation of platforms/ramps and of mechanical stops and locks;
- checking, as far as practicable, of the alarms and safety devices.

4.14.1.3 Fire protection, detection and extinction
.1 Within the scope of survey of fire protection, detection and extinction arrangements as required for the annual survey of all ships in 4.4.2 attention is to be given to the particular arrangements related to Ro-Ro cargo spaces, such as:
- fire detection systems and alarms;
- fixed fire-extinguishing arrangements (gas, water-spraying or foam systems);
- portable fire extinguishers in spaces and at entrances;
- ventilation and related safety devices (including remote control on the bridge); and
- electrical equipment of a safe type.

4.14.2 Passenger ships

4.14.2.1 Watertight bulkheads
.1 The survey of watertight bulkheads and arrangements consists of:
- examination, as far as practicable, of collision and watertight bulkheads, and confirmation that their watertight integrity has not been impaired;
- checking the diagram provided on the navigation bridge showing the location of the watertight doors and related indicators for their open/closed position;
- testing operation of local and remote control (from the navigation bridge) of the watertight doors, and in particular, operation from each side of the bulkhead of audible alarms or visual signals and control handles, as required or fitted;
- confirmation of operation of watertight doors in the event of failure of main and emergency sources of power;
- confirmation that electrical motors associated circuits and control components are protected to IPX7 standard;
- confirmation that notices are affixed at appropriate locations.

4.14.2.2 Openings in shell plating
.1 The survey consists of:
- examination of the arrangements for closing sidescuttles and their deadlights, as well as scuppers, sanitary discharges and similar openings and other inlets and discharges in the shell plating below the margin line,
- examination of the door position indicators and associated circuits and control components are protected to IPX8 standard as well as door movement warming signals are protected to IPX6 standard,
- confirmation that valves for closing the main and auxiliary sea inlets and discharges in the machinery spaces are readily accessible, and that indicators showing the status of the valves are provided, as required or fitted;
- confirmation that gangway access and cargo ports fitted below the margin line may be effectively closed and that the inboard ends of any ash or rubbish chutes are fitted with an effective cover.

4.14.2.3 Miscellaneous
It is to be verified that the emergency escape routes from passenger and crew space, including related stairways and ladders, are kept clear.

4.14.3 Ro-Ro passenger ships
.1 The scope of the annual survey and class renewal survey of Ro-Ro passenger ship is to include the scope of surveys required for the service notations Ro-Ro cargo ship and passenger ships, as detailed in 4.14.1 and 4.14.2.
.2 In addition to .1, the condition of means of escape as well as of fire protection, detection and extinction in special category spaces is to be checked.

4.15 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR TECHNICAL FLOATING UNITS

Following requirements apply to type notations split hopper barge, dredger, self-unloading hopper barge. Examinations according to the requirements stated in 4.2 and 4.4 are to be fulfilled as far as applicable.

4.15.1 The survey is to include the following items, as far as required or fitted, according to the service notation of the ship:
.1 for split hopper barge (split hopper unit), visual examination, as far as practicable, of superstructure hinges and blocks, deck hinges, hydraulic jacks and associated piping systems and alarms,
.2 for dredger, self-unloading hopper barge, split hopper barge:
   a) visual examination, as far as practicable, of attachments of suction piping and lifting systems to the structure and external examination of piping in dredging machinery spaces for absence of corrosion and leakage,
   b) checking the condition of the dredging machinery space and related equipment with regard to electrical shocks, protection from rotating machinery, fire and explosion hazards.

4.16 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR TUGS AND SUPPLY VESSELS

Following requirements apply to type notations tug and supply vessel. Examinations according to the requirements stated in 4.2 and 4.4 are to be fulfilled as far as applicable.

4.16.1 The surveys are to include a general external examination of the towing hook or towing winch, as fitted, and unhooking device, as far as practicable.

For vessels with additional class notation FIR the survey is also to include examination of the fixed self-protection water-spraying system, the water fire extinguishing systems and/or foam fire-extinguishing systems, including the fireman’s outfits and the compressor.

4.17 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR FISHING VESSELS

Examinations according to the requirements stated in 4.2 and 4.4 are to be fulfilled as far as applicable.

4.17.1 The survey is to include:
   .1 General examination of areas subject to damage, corrosion or wastage, such as the stern ramp, weather deck in way of the working area of the nets, connections to hull structure of masts, gantries, winches and traw gallow (for side trawlers).
   .2 General examination of the measures for the protection of the crew against falling overboard, such as storm rails, means of protection near stern ramp, etc.
PART 1 - CHAPTER 5

5 INTERMEDIATE SURVEY

5.1 GENERAL

5.1.1 Intermediate surveys are to be held concurrently with statutory Annual or Intermediate surveys whenever practicable. The Intermediate survey is to be carried out either at or between the second and third Annual survey. Those items which are additional to the requirements of the Annual survey may be surveyed either at or between the second or third Annual survey. A survey meeting is to be held prior to the commencement of the survey. Concurrent crediting to both Intermediate survey and Renewal survey for surveys and thickness measurements of spaces are not acceptable.

5.2 HULL AND HULL EQUIPMENT SURVEY - ALL SHIPS

5.2.1 Survey according to basic and additional requirements stated in 4.2 are to be carried out, as far as applicable, relating to the type of ship and its age.

5.2.2 In addition to above mentioned, requirements stated in Table 5.2-1 are to be carried out, as far as applicable, for the self-propelled steel vessels of 100 GT and above.

5.3 MACHINERY, ELECTRICAL EQUIPMENT AND FIRE PROTECTION ARRANGEMENTS - ALL SHIPS

5.3.1 For the machinery, electrical equipment and fire protection arrangements, the Intermediate survey is to be consisted primarily of the provisions of Annual surveys listed in 4.4 so far as applicable.

All boilers having working pressure exceeding 3.5 bar and a heating surface exceeding 4.5 m², are to be surveyed internally twice in every five year period (usually during intermediate and Renewal survey). The period between surveys will not exceed 3 years. An extension of examination of the boiler of up to 3 months beyond the due date can be granted in exceptional circumstances (see the Rules, Part 1 - General requirements, Ch. 1 - General information, 5.5.1).

5.3.2 For all ships the electrical generating sets are to be examined under working conditions.

5.4 ADDITIONAL INTERMEDIATE SURVEY REQUIREMENTS FOR OIL TANKERS WITH AFFIXED ESP NOTATION OTHER THAN DOUBLE HULL OIL TANKERS

5.4.1 The surveys according to the provisions of 4.5, 5.2 and 5.3 are to be carried out so far as applicable.

Requirements stated in Table 5.2-1 are to be carried out.

In application, for oil tankers 10 to 15 years of age, an in-water survey may be considered.

In application, for oil tankers exceeding 15 years of age, a survey in dry dock is to be part of the intermediate survey. The overall and close-up survey 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 holds and ballast tanks are considered to be the parts below light ballast water line.

5.4.2 For weather decks, an examination as far as applicable of cargo, crude oil washing, bunker, ballast, steam and vent piping on the weather decks, 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, gauged, or both.

5.4.3 A 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 testing of the insulation resistance of the circuits is to be carried out (see also NOTE in 11.2.1).

In cases where a proper record of testing is maintained, consideration may be given to accepting recent readings. If any 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 gas free condition and are to be carried out within an acceptable time period.

5.4.4 The survey extent of cargo and ballast tanks dependent on the age of the ship is specified in Table 5.4-1.
### Table 5.2-1
Intermediate survey of hull – all ships

For additional requirements for oil tankers, ore/bulk/oil ships and ore/oil ships see Table 5.4.1 and for general dry cargo ships see Table 5.8.1

<table>
<thead>
<tr>
<th>Ships from 5 to 10 years of age</th>
<th>Ships older than 10 years</th>
<th>Dry cargo ships over 15 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. For ships over 5 years of age, a general, internal examination of representative ballast tanks is to be carried out. If there is no hard protective coating, soft or semi-hard coating, or POOR coating condition, the examination is to be extended to other ballast tanks of the same type.</td>
<td>1. For ships over 10 years of age, a general, internal examination of all ballast tanks is to be carried out (see Notes). 2. Suspect areas identified at previous surveys are to be examined. <strong>Thickness measurements are to be taken of the areas of substantial corrosion (identified at previous surveys)</strong> and the extent of thickness measurements is to be increased to determine areas of substantial corrosion. Table 7.2.1-3a may be used as guidance for these additional thickness measurements. These extended thickness measurements are to be carried out before the intermediate survey is credited as completed.</td>
<td>1. As for ships over 10 years of age. 2. In the case of dry cargo ships over 15 years old, other than bulk carriers or general dry cargo ships, an internal examination of selected cargo holds is to be carried out.</td>
</tr>
<tr>
<td>2. Suspect areas identified at previous surveys are to be examined. <strong>Thickness measurements are to be taken of the areas of substantial corrosion (identified at previous surveys)</strong> and the extent of thickness measurements is to be increased to determine areas of substantial corrosion. Table 7.2.1-3a may be used as guidance for these additional thickness measurements. These extended thickness measurements are to be carried out before the intermediate survey is credited as completed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. In addition, where required by B), internal examination of applicable salt water ballast spaces is to be carried out. When considered necessary by the Surveyor, or where extensive corrosion exists, thickness measurement is to be carried out.</td>
<td>4. The anchors are to be partially lowered and raised using the windlass. 5. In the case of ships over 10 years of age, other than ships engaged in the carriage of dry cargo cargoes only or other than oil tankers, chemical tankers and double hull oil tankers, an internal examination of selected cargo spaces is to be carried out.</td>
<td></td>
</tr>
</tbody>
</table>

#### NOTES:

A) If such examination reveals no visible structural defects the examination may be limited to a verification that the protective coating remains effective.

B) For ballast tanks, excluding double bottom tanks, if there is no hard protective coating, soft or semi-hard coating, or POOR coating condition, and it is not renewed, the tanks in question are to be internally examined at annual intervals. When such conditions are found in double bottom ballast tanks, the tanks in question may be internally examined at annual intervals.
### Table 5.4-1
Additional requirements for Intermediate survey of hull - oil tankers

<table>
<thead>
<tr>
<th>Oil tankers 5 - 10 years of age</th>
<th>Oil tankers over 10 years of age</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 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.</td>
<td>1. The requirements of the Intermediate Survey are to be to the same extent as the previous Renewal Survey as required in 7.7.1.1 to 7.7.1.7.1, 7.7.2, 7.7.4, 7.7.5, and 3.3.2. However, pressure testing of cargo and ballast tanks and the requirements for longitudinal strength evaluation of Hull Girder as required in 7.7.2.4 are not required unless deemed necessary by the attending Surveyor. See also 5.4.1</td>
</tr>
</tbody>
</table>

**NOTES:**

A) A Ballast Tank is to be examined at subsequent annual intervals where:
- a hard protective coating has not been applied from the time of construction, or
- a soft or semi-hard coating has been applied, or
- substantial corrosion is found within the tank, or
- the hard protective coating is found to be in less than GOOD condition and the hard protective coating is not repaired to the satisfaction of the Surveyor, or

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

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5.4.5 For ships over 10 (ten) years of age machinery and boiler spaces including tank tops, bilges and cofferdams, sea suction and overboard discharges are to be generally examined.

5.4.6 For oil tankers, the fixed fire-fighting system for the cargo pump rooms is to be examined, and it is to be confirmed that, as appropriate, any foam compounds have been checked and that the distribution pipework has been proved clear.

5.4.7 For the crude oil washing system the following is to be examined:

1. The crude oil washing piping outside the cargo tanks. If upon examination there are any doubt as to its condition, the piping may be required to be pressure tested, gauged or both. Particular attention should be paid to any repairs such as welded doublers.

2. The satisfactory operation of the isolation valves to steam heaters for washing water, when fitted, is to be confirmed.

3. At least two selected cargo tanks for the express purpose of verifying the continued effectiveness of the installed crude oil washing and stripping systems.

4. The manual and/or remote operation of the individual tank valves (or other similar closing devices) to be kept closed at sea.

5.5 **ADDITIONAL INTERMEDIATE SURVEY REQUIREMENTS FOR BULK CARRIERS WITH AFFIXED ESP NOTATION**

5.5.1 The requirements of Annex C1 are to be complied with as applicable.

5.6 **INTENTIONALLY LEFT BLANK**

5.7 **INTERMEDIATE SURVEY REQUIREMENTS FOR CHEMICAL TANKERS**

5.7.1 The survey is to consist of the provisions of 4.7, 5.2 and 5.3 so far as applicable (for chemical tankers with affixed ESP notation see also Annex A).

5.7.2 Vent line drainage arrangements are to be examined.

5.7.3 It is to be verified that, where applicable, pipelines and independent cargo tanks are electrically bounded to the hull.

5.7.4 It is to be confirmed that spares are provided for cargo area mechanical ventilation fans.

5.7.5 It is to be verified from the cargo record book that the pumping and stripping arrangements have been emptying the tanks efficiently and are all in working order.

5.7.6 It is to be confirmed, if possible, that the discharge outlet(s) are in good condition.
5.7.7  The satisfactory operation of the recording device is to be confirmed, as fitted, and it is to be verified by an actual flow test that has an accuracy of \( \pm 15\% \) or better.

5.7.8  It is to be confirmed that the ventilation equipment for residue removal is satisfactory and that the pressure in the driving medium for portable fans of ventilation equipment for residue removal can be achieved to give the required fan capacity.

5.8  ADDITIONAL INTERMEDIATE SURVEY REQUIREMENTS FOR GENERAL DRY CARGO SHIPS

5.8.1  In addition to the requirements stated in 4.11, 5.2 and 5.3 ballast tanks and cargo holds are to be examined in accordance with Table 5.8-1.

5.9  ADDITIONAL REQUIREMENTS AFTER DETERMINING COMPLIANCE WITH SOLAS 74, CH. II-1/25, FOR GENERAL CARGO SHIPS WITH SINGLE HOLD

5.9.1  For ships less than 80 meters in length, or for ships built before 1 July 1998 less than 100 meters in length, with single hold not protected by double hull, requirements of 4.10.1 apply.
### Table 5.8-1
Additional requirements for Intermediate Survey of hull – General dry cargo ships

<table>
<thead>
<tr>
<th>Age Range</th>
<th>5 - 10 years of age</th>
<th>10 - 15 years of age</th>
<th>Over 15 years of age</th>
</tr>
</thead>
</table>
| **Tanks used for water ballast** | a) An Overall Survey of Representative Spaces 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 corrosion prevention system remains efficient.  
   b) Where POOR coating condition (as defined in 1.2.10), soft or semi-hard coating, corrosion or other defects are found in salt water ballast spaces or where protective coating was not applied from the time of construction, the examination is to be extended to other ballast spaces of the same type. (see also NOTE A)  
   c) In addition to the requirements above, areas found suspect according to 1.2.7 at the previous surveys are to be surveyed in accordance with the provisions indicated in 4.11.2.1 | a) For tanks used for water ballast, an overall survey of all tanks is to be carried out. If such inspections reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains efficient.  
   b) The requirements of b) and c) of general dry cargo ships 5-10 years of age shall apply | a) The requirements of the Intermediate Survey shall be to the same extent as the previous Renewal Survey as required in 7.12.1 to 7.12.4. However, tank testing specified 7.12.4, survey of automatic air pipe heads (see Notes in 7.12.1.5 and 7.12.3), and internal examination of fuel oil, lube oil and fresh water tanks (see 7.12.3) are not required unless deemed necessary by the attending Surveyor.  
   b) In lieu of the requirements of 7.12.1.2, an underwater survey may be considered as equivalent. |
| **Cargo Holds** | d) An Overall Survey of one forward and one after cargo hold and their associated 'tween deck spaces.  
   e) Areas found suspect according to 1.2.7 at the previous Renewal Survey. | c) An Overall Survey of all cargo holds and 'tween deck spaces.  
   d) Areas found suspect according to 1.2.7 at the previous surveys.  
   e) 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 number of thickness measurements is to be increased to determine the extent of substantial corrosion. Table 7.2.1.3a may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the survey is credited as completed. | |

**NOTES:**

A) In water ballast tanks other than double bottom tanks, where a hard protective coating is found in POOR condition, 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.
6 BOTTOM SURVEY

6.1 GENERAL

6.1.1 At Docking surveys (see 2.4.1) or in-water surveys (see 2.4.2) the Surveyor is to examine items of the Rules covering hull structures, machinery installations and equipment, so far as necessary and practicable, in order to be satisfied as to the general condition. Special attention is to be paid to the connection between the bilge strakes and the bilge keels.

6.1.2 While docking, as a preparation for painting of the underwater body, and before commencing the survey, the shell is to be thoroughly cleaned, scratched out and all the rust removed.

When a ship is in dry-dock or on a slipway, it is to be placed on blocks of sufficient height and with the necessary staging to permit the examination of elements such as: shell plating including bottom and bow plating, stern frame and rudder, sea chests and valves, propeller, etc. Passages through structures are to be provided, also.

6.1.3 When Docking survey is held concurrently with the Renewal survey all items normally not accessible for the Renewal survey if the ship is not in dry-dock or slipway are to be examined.

6.1.4 For due dates and time intervals regarding Docking survey see Table 6.1-1.

6.2 DOCKING SURVEY

6.2.1 Docking survey for hull of steel ships, aluminium alloy ships

6.2.1.1 The shell is to be examined, which consists of examining the outside ship’s bottom and bow plating, keel, bilge keels, stem, stern frame, and all underwater appendages (such as hydrofoils, hydrofoil supports, skirt fixations, shaft brackets, etc.), as far as applicable.

6.2.1.2 Attention is to be given to parts of the structure particularly liable to excessive corrosion or to deterioration from causes such as chafing and lying on the ground, and to any undue unfairness of the plating of the bottom. Special attention is to be paid to the connection between the bilge strakes and the bilge keels. During survey of aluminium alloy ships attention is to be given to the welding, connections of appendages to the hull and visible hull defects or corrosion with surrounding areas.

6.2.1.3 Visible parts of the propeller (main propeller and side thrusters), sternbush and shaft struts are to be examined. The clearance of the sternbush and the efficiency of the oil glands (where applicable) is to be ascertained (see also 10).

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 (see also 10).

6.2.1.4 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. Side valves and cocks are to be opened up. Upon re-assembly the valves should be tested to confirm:

.1 satisfactory operation of the valves and their actuating mechanisms;
.2 full closing of the valve;
.3 tightness of the valve when fully seated.

Testing of actuating mechanisms should include the testing of any remote controls e.g. extended spindles, rod gearing.

If the operation of the actuating mechanism is not satisfactory, the mechanism should be further examined to determine the cause, which may include the stripping and opening out of the mechanism as deemed necessary.

Non-metallic expansion joints in piping systems, if located in a system which penetrate the ship’s side and both the penetration and the expansion joint are located below the deepest load waterline, shall be examined and replaced if necessary, or at an interval recommended by the manufacturer.

6.2.1.5 The rudder is to be lifted for examination of the pintles if considered necessary by the Surveyor. The clearances of the rudder bearings are to be measured and recorded. Where applicable, pressure test of the rudder may be required as deemed necessary by the Surveyor.

6.2.1.6 At every regular Docking survey for oil tankers and combination carriers five years old and over, a test for insulation resistance is to be made for circuits terminating in, or passing through dangerous zones or spaces (see also NOTE in 11.2.1).

6.2.1.7 When Docking survey is to be held concurrently with the Renewal survey, in addition to previously mentioned, the following requirements are to be fulfilled:

.1 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 are to be opened up.
.2 Visible parts of rudder, rudder pintles, rudder shafts and couplings, and securing arrangements are to be examined. If deemed necessary by the Surveyor the rudder is to be lifted.
.3 The chain cables are to be ranged and examined on all ships over five years old. If any length of chain cable is found to be reduced in mean diameter at its most worn part by 12 per cent or more from its nominal diameter, it is to be renewed. The anchors are to be examined and weighed if considerable deterioration has been noticed. If the weight of the anchor has been reduced by 10 % or more from its nominal weight it is to be renewed.
.4 Thickness measurements are normally to be carried out in accordance with applicable requirements stated in 7.
6.2.1.8 For all floating units subject to classification by the Register, unless otherwise agreed Docking survey is to be conducted at intervals not exceeding 5 (five) years. The Register may, upon the owner’s request, accept longer intervals for Docking survey depending upon the type and intended purpose, and place of anchorage (for Docking survey of floating docks see 7.10.4.7).

6.2.1.9 While performing Docking survey of technical floating units, hopper doors and their fittings, as well as hopper valves are to be checked for proper functioning (see 7.11.4.2).

6.2.1.10 Where a vessel has an IWS notation, the conditions of the high resistant paint is to be confirmed at each dry-docking survey in order that the IWS notation can be maintained.

6.2.2 Docking survey of hull for wooden ships, fibre reinforced plastic ships

6.2.2.1 The Docking survey of hull for wooden ships consists of:

.1 Examination of the condition of the outside planking and its caulking on each side of the ship, amidships and at the ends, in the vicinity of the waterline and near to the keel (allowable deterioration of the planking is 25 per cent of its nominal thickness). At the discretion of the attending Surveyor the metal sheathing is to be renewed either entirely or in the deteriorated areas.

.2 Examination of the condition of the keel, false keel, stem, and sternpost, with a special attention to parts of the structure liable to excessive corrosion or to deterioration from causes such as chafing and lying on the ground. If the underwater body is protected with fibre-glass or other similar materials the Surveyor is to examine adhesion of such material to the shell planking. The Surveyor is also to establish if there are any cracks in before mentioned protection of the underwater body through which the water could penetrate to shell planking.

.3 During every regular Docking survey examination of all suction and discharge valves, including their fastenings to the hull and gratings is to be performed. When Docking survey is performed concurrently with the Renewal survey, all suction and discharge valves, including their fastenings to the hull and gratings are to be dismantled, opened up and examined. In the case of cast iron sea valves, or if they are of an unapproved type, they are to be opened up for examination at every regular Docking survey.

.4 Examination of the bilge system, which is to be opened up, examined and tested under working conditions, as deemed necessary. All sea connections, sludge boxes, strainers and valves related to the system mentioned before are to be opened up and examined. The bilge and ballast piping is to be tested. Additionally, operation of extended spindles and level alarms, where fitted are to be examined, as well as emergency sea inlets.

.5 Measurement of clearances in the rudder bearings and rudder pintles, as well as the wear down in the rudder carrier bearing and sternbush. If deemed necessary by the Surveyor the rudder is to be lifted. On Simplex type rudder the nut on the end of the rudder stock is to be checked for unscrewing because of the vibration.

.6 Examination of the propellers and propeller shafts is to be conducted in accordance with the requirements stated in 10.

.7 Examination of the grounding plates (for lightning-conductor, radio and electrical equipment).

.8 For fiber-reinforced plastic ships the overall hull survey is to be carried out to determine visible signs of lining deterioration from causes such as chafing and lying on the ground. Additionally, the underwater part of the hull is to be surveyed for possible appearance of osmosis.

6.3 IN-WATER SURVEY

6.3.1 Where permitted (see also 2.4.2) the In-water Survey is to be carried out in sheltered water with weak tidal streams and currents. The in-water visibility and the cleanliness of the hull below the waterline is to be clear enough to permit meaningful examination which allows the Surveyor and the in-water survey firm to determine the condition of the plating, appendages and the welding.

The Register is to be satisfied with the methods of orientation 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.

6.3.2 The equipment, 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 in-water survey firm to test all equipment beforehand. The survey is to be carried out under the surveillance of a surveyor by an in-water survey firm approved as a service supplier according to Rules, Part I - General Requirements, Ch. 4 - Approval of manufacturers and service suppliers. The Surveyor is to be satisfied with the method of pictorial presentation and a good two-way communication between the Surveyor and the divers is to be provided.

6.3.3 Upon completion of the survey the divers shall submit to the Surveyor a detailed report including video tapes.

6.3.4 If the In-water survey reveals damage or deterioration that requires early attention, the Surveyor may require that the ship be dry-docked in order that detailed survey can be undertaken and the necessary repairs carried out.
6.4 MACHINERY VERIFICATION RUNS

6.4.1 As part of the Renewal survey of the 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 Surveyors’ satisfaction.

6.4.2 If the significant repairs as stated in 6.4.1, is considered by Register 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 the Rules, Part 9 – Machines, 2.14.13 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 Register may accept a reduction of the test plan.

Table 6.1-1
Due dates and time intervals regarding Docking survey

<table>
<thead>
<tr>
<th>STEEL SHIPS 1) 2)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4 years</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>see A)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A) Survey interval is ± 9 months.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FIBER-REINFORCED PLASTIC AND ALUMINIUM SHIPS 2), WOODEN SHIPS (with age ≤ 10 years)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4 years</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>see B)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B) Survey interval is ± 6 months.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WOODEN SHIPS (with age over 10 years)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4 years</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>see C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C) Survey interval is ± 3 months.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) For all steel ships there should be a minimum two Docking surveys during each five year period of validity of the Certificate of Class. In addition to that it is obligatory for the ships with GT ≥ 500 that one of two Docking surveys is to be performed as a part of the Renewal survey. In all cases the interval between any two such surveys should not exceed 36 months.

2) For passenger ships in international navigation an inspection of the ship’s bottom is required annually. In a period of five years, two such inspections are to take place out of water. The maximum interval between these inspections is 36 months. IWS may be carried out each year when an inspection out of water is not required. For passenger ships in international navigation older than 15 years, performance of IWS is subjected to special consideration and approval of the Register.
7 RENEWAL SURVEY

7.1 GENERAL

During Renewal survey the Annual survey requirements (see 4) are to be completed with as applicable for all ships.

Additional requirements for oil tankers, ore/bulk/oil ships, ore/oil ships, chemical tankers, general dry cargo ships and livestock carriers are given in 7.7, 7.8, 7.12 and 7.13.

The requirements for thickness measurement and Close-up survey are given in 7.5 and 7.6.

If docking survey is to be carried out concurrently with the Renewal survey or as a part of the Renewal survey, the requirements stated in 6.2.1.7 are to be complied with.

For preparation, conditions and documentation of survey see 3.2 and 3.3.

Renewal surveys are to be held concurrently with statutory Renewal surveys whenever practicable.

7.2 HULL AND HULL EQUIPMENT REQUIREMENTS - STEEL SHIPS, ALUMINIUM ALLOY SHIPS

7.2.1 General requirements for hull and hull equipment surveys

The Renewal survey is to include, in addition to the requirements of the Annual survey (see 4.2), examination, tests and checks of sufficient extent to ensure that the hull, machinery, equipment and related piping (see 7.2.1.10) are in satisfactory condition and fit for the intended purpose for the new period of validity of the Certificate of Class of five years to be assigned, subject to proper maintenance and operation and the periodical surveys being carried out at the due dates.

The examinations of the hull are to be supplemented by thickness measurements and testing (see 7.5 and 7.2.1.10), 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.

Additional hull survey requirements for oil tankers and combination carriers are stated in 7.7 and for general dry cargo ships in 7.12 respectively. For bulk carriers the requirements of Annex C1 or Annex C are to be complied with as applicable.

The Company is responsible to prepare the ship for survey in accordance with the requirements stated in 3.2 and Table 7.2.1-1.

Anchoring and mooring equipment is to be examined, and the anchors and chain cables are to be ranged, examined and the required complement and condition verified. The chain locker, holdfasts, hawse pipes and chain stoppers are to be examined and pumping arrangements of the chain locker tested. At second Renewal survey and subsequent Renewal surveys, chain cables are to be gauged and renewed in cases where their mean diameter is worn over 12% (see 6.2.1.7.5).

All spaces including holds and their 'tween decks where fitted, double bottom, deep, ballast, peak, and cargo tanks, pump rooms, 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, lube oil and fresh water tanks is to be carried out in accordance with Table 7.2.1-2. At Renewal survey No. 3 and subsequent Renewal surveys, structural downflooding ducts and structural ventilation ducts are to be internally examined.

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 deck top and bilge wells. Particular attention is to be given to sea suctions, sea water cooling pipes and overboard discharge 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 where wastage exceeds allowable limits.

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 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 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.

Automatic air pipe heads installed on the exposed decks (see 1.2.18) of all ships are to be completely examined (both externally and internally) in accordance with the requirements of Table 7.2.1-4. 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 galvanised steel. For passenger ships the air pipe heads on Ro-Ro decks are to be examined as for exposed decks.

The masts and standing rigging are to be examined.

Hull structure below ceiling, insulation, sheathing and other covering is to be examined in accordance with the requirements of Table 7.2.1-1.

Tanks are to be internally examined and tested in accordance with the requirements of Table 7.2.1-2.
7.2.2.3 Bow doors, inner doors, side shell doors and stern doors on Ro-Ro passenger ships

7.2.3.1 The Renewal survey is to include, in addition to the requirements of the Annual Survey as required in 4.14.1.1, examination, tests and checks of sufficient extent to verify that the bow, inner, side shell and stern doors, are in satisfactory condition and considered able to remain in compliance with applicable requirements, subject to proper maintenance and operation in accordance with the Operation and Maintenance Manual (OMM) or manufacturer’s recommendations and the periodical surveys being carried out at the due dates for the five year period until the next Renewal survey.

The examinations of the doors are to be supplemented by thickness measurements and testing to verify compliance with applicable requirements so that the structural and weathertight integrity remain effective. The aim of the examination is to identify corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.

7.2.3.2 The bow, inner, side shell and stern doors are to be surveyed as follows:

.1 A survey of the items listed in 4.14.1.1.4 and 4.14.1.1.5 is to be carried out
.2 Non-destructive testing and thickness measurements are to be carried out on securing, supporting and locking devices, including welding, to the extent considered necessary by the surveyor. Whenever a crack is found, an examination with NDT is to be carried out in the surrounding area and for similar items as considered necessary by the surveyor.
.3 The maximum thickness diminution of hinging arms, securing, supporting and locking devices is to be treated according to the normal procedure for primary structures, but is not to be more than 15% of the as-built thickness or the maximum corrosion allowance, whichever is less. Certain designs may be subject to a special consideration by the Register.
.4 Checking the effectiveness of sealing arrangements by hose testing or equivalent is to be carried out.
.5 Clearances of hinges, bearings and thrust bearings are to be taken. Unless otherwise specified in the OMM or by manufacturer’s recommendation, the measurement of clearances on Ro-Ro cargo ships may be limited to representative bearings where dismantling is needed in order to measure the clearances. If dismantling is carried out, a visual examination of hinge pins and bearings together with NDT of the hinge pin is to be carried out.
.6 The non-return valves of the drainage system are to be dismantled and examined.

7.2.4 Aluminium alloy ships

7.2.4.1 For aluminium alloy ships the survey is to be supplemented with thickness measurements of structural ele-
ments, shell plating and stiffeners, where substantial damages or defects due to corrosion or galvanic current is found.

Thickness measurements are to be carried out on following positions:

.1 Suspect areas throughout the ship.
.2 Stern shell plating and shell plating in way of engine rooms.

Structural elements, plating and stiffeners where the survey revealed damage, wastage or thickness diminution over allowable limits, are to be renewed to the original thickness at the Surveyor’s satisfaction.

On positions where high structural strain is possible, detailed survey is to be carried out, and if deemed necessary supplemented with a non-destructive examination. Where the survey reveals structural defects, repairs are to be carried out promptly and thoroughly.

Special attention is to be given to the corners of openings and other structural discontinuities.

7.3 Hull, Hull Equipment and Machinery Requirements - Wooden Ships, Fibre Reinforced Plastic Ships

7.3.1 The rigidity, i.e. the extent and the type of the Renewal survey for wooden ships is to be determined according to the ship’s age, and used type of timber and material for fastenings.

7.3.2 For Renewal survey of ships up to 20 (twenty) years of age the following is to be fulfilled, as far as applicable:

.1 Requirements stated in 4.3 and 6.2.2 are to be fulfilled.
.2 Any surfaces in contact with rust are to be well scraped and the outside surface of the shell planking, from the light waterline to the covering boards, is to be cleaned and scraped. Additionally, if considered necessary by attending Surveyor a sufficient amount of ceiling and timber boards are to be removed. Additionally, if considered necessary by the Surveyor a sufficient amount of the outer shell planking, inner sparing and metal sheathing if any is to be removed to enable a close examination of the structure.
.3 The sheerstrake planking is to be examined and, if considered necessary by attending Surveyor, tested by drawing a sufficient number of tree nails, or by boring if no tree nails are fitted. The holes resulting from the latter are to subsequently to be closed by tree nails or bolts.
.4 Particular attention is to be given to the planking on the upper deck or weather deck. Special attention is to be given to the planking adjacent to pillars and areas near windlasses and hatchway openings, as well as to the areas near deck transverses and longitudinals. When necessary metal sheathing in chain locker is to be examined, and if considered necessary by attending Surveyor, a certain amount of such metal sheathing is to be removed in order to establish the condition of the structure below, in extent as deemed necessary by the attending Surveyor.
.5 If examination reveals rot or decay due to woodworm, the affected areas are to be renewed. Planks showing evident signs of wear are to be bored and renewed either wholly or partially when the deterioration exceeds 20 mm or if it is worn by 25 per cent or more from its required nominal thickness.
.6 Where the keel and centre keelson are connected by iron fastenings, a sufficient number of such fastenings is to be drawn to check their condition (all worn out fastenings are to be renewed), where this is impracticable, additional fastenings, as required by the Surveyor are to be fitted in the connection of keel with centre keelson, of stern and sternpost with aprons and inner sternposts, and also in the connection of other main structural members.
.7 Particular attention is to be given to the examination of breasthooks, frames, beams (particularly at their ends), knees, hawse timbers, knight heads, transoms and all fore and aft structural members.
.8 Where steel brackets are not sticking well enough to the inner ceiling or beams, they are to be stuck by hammers.
.9 Bulwarks, bulwark stays, guard-rails and similar fittings, and superstructures in general are to be examined in order to check their condition.
.10 Cargo holds, bulkheads and bulkhead openings are to be examined.
.11 The watertightness of hatch covers is to be checked by testing with water spilling.
.12 Engine foundations in the machinery spaces are to be examined. Additionally, all structural elements made of steel (including parts of engine foundations) are to be well cleaned and the rust has to be removed before painting.
.13 Masts, mast’s armature, and standing and loose rigging are to be visually examined, as well as the fastening of the mast to the structure.
.14 Anchors, chain-cables, shackles, hooks, bolts and all other similar arrangements used for connecting anchors to anchor chains are to be visually inspected for wear and tear. Any length of chain-cable which is found to be reduced in mean diameter at its most worn part by 12 per cent or more from its required nominal diameter should be renewed.
.15 The rudder is to be thoroughly examined and, if deemed necessary by the Surveyor, it is to be lifted for the examination of the pintles. Rods, chains, ropes, sheaves, pins
and rollers related to steering gear are to be examined for wear and tear.
.16 Main and auxiliary steering gears are to be carefully examined and tested under working conditions. If considered necessary by the Surveyor, they are to be opened up in extent deemed appropriate.
.17 Ropes intended for mooring and towing are to be checked.
.18 In addition to aforementioned examination of main and auxiliary machinery installations in accordance with the requirements stated in 8 is to be fulfilled, in extent as far as applicable:

**NOTE:** Extent of survey and overhauling of machinery is to be determined by the Surveyor depending on the general condition, number of working hours from the log-book, type of the installation, records from previous surveys, and results of testing under working conditions.

### 7.3.3 For Renewal survey of ships older than 20 (twenty) years, the following is to be fulfilled, as far as applicable:

.1 Requirements stated in 7.3.2 are to be fulfilled.
.2 Nails, bolts, etc. are to be drawn up and examined, but in no case in amount lesser than:
   a) two bolts connecting keel with centre keelson,
   b) one bolt from the keelson-scharphs,
   c) two bolts from the horizontal brackets, starboard and portside, and two bolts from the vertical brackets, starboard and portside,
   d) two nails or bolts from butts near the keel on each side of the ship, as well as two nails or bolts from butts of the outside planking, starboard and portside.
.3 Several lengths of covering boards, waterways, as well as inner waterways shall be removed as considered necessary by the Surveyor, in order to carefully check the condition of the timber in way of the ends of beams and frames.
.4 Superstructures and erections are to be scraped, particularly in those positions which are liable to greater deterioration, and parts are to be removed as required for renewal and/or repair.
.5 The heel of the mast is to be checked, as well as its penetrations through decks (one or two wedgings are to be removed). Visual inspection of the mast is to be performed in order to establish possible transverse cracks. If visual examination or testing by sounding of the mast reveals woodworm or other holes, not affecting the strength of the mast, they are to be closed, in order to prevent penetration of the water and possible rotting or decay of the mast. Standing and loose rigging, as well as mast’s armature are to be dismantled if considered necessary by attending Surveyor. Sails and spare sails are to be examined.
.6 The windlass and other items of the deck machinery are to be examined and dismantled as deemed necessary by the Surveyor.

### 7.3.4 For ships with hull made of plywood (stiffened wood) or with wooden hull covered with protective lining or covering, following is to be carried out and, where necessary, repairs are to be carried out to the Surveyors satisfaction:

.1 Attention is to be given to the condition of edge protection as well as of protective lining and also to establish cracks where water may enter under protective lining/covering.
.2 Establishing possible de-lamination between layers.

### 7.3.5 For fiber-reinforced plastic ships the survey is to be performed to find possible alterations of surface condition or damages from causes such as chafing and lying on the ground. Where the survey reveals structural defects, repairs are to be carried out to the Surveyors satisfaction. The Surveyor may request for grinding of suspect areas or for taking of hull structure samples as well as for measuring of the moist percentage in hull structure.

Special attention is to be given to the positions where high structural strain is possible, corners of openings and other structural discontinuities.

### 7.4 FIRE PROTECTION - ALL SHIPS

#### 7.4.1 The survey in accordance with the requirements stated in 4.4.2 is to be carried out.

#### 7.4.2 It is to be confirmed that minimum recommended maintenance is carried out by the service supplier as follows.

At least biennially (intervals of 2 years ± 3 months) in passenger ships or at each intermediate or renewal survey in cargo ships, the following maintenance is to be carried out:

.1 all high pressure cylinders and pilot cylinders should be weighed or have their contents verified by other reliable means to confirm that the available charge in each is above 90 % of the nominal charge. Cylinders containing less than 90 % of the nominal charge should be refilled. The liquid level of low pressure storage tanks should be checked to verify that the required amount of CO₂ to protect the largest hazard is available;
.2 the hydrostatic test date of all storage containers should be checked. High pressure cylinders should be subjected to periodical tests at intervals not exceeding 10 years. At the 10-year inspection, at least 10% of the total number provided should be subjected to an internal inspection and hydrostatic test. If one or more cylinders fail, a total of 50% of the onboard cylinders should be tested. If further cylinders fail, all cylinders should be tested. Flexible
7.4.4 Fire extinguishers and associated propellant gas cylinders if any are to be subject to pressure testing every 10 years, by manufacturer or approved firm. At least one extinguisher of each type manufactured in the same year and kept onboard a ship should be test discharged at five yearly intervals (as part of a fire drill).

7.5 THICKNESS MEASUREMENT AND REPORTING

7.5.1 For thickness measurement and reporting see also 3.2.5. For initial requirements while determining parts of ships structure where thickness measurements are to be carried out see 3.1.9.

7.5.2 Thickness measurements required in context of hull structural surveys if not carried out by the Register are to be witnessed by a Surveyor on board, while the gaugings are taken, to the extent necessary to control the process. The thickness measurement operator is to be part of the survey meeting which is to be held prior to commencing the survey.

7.5.3 Thickness measurements are not to be performed before the fourth Annual survey. Results of such measurement may be accepted for Renewal survey. Concurrent crediting to both Intermediate survey and Renewal survey for surveys and thickness measurements of spaces are not acceptable.

7.5.4 Thickness measurements are to be taken at the forward and aft areas of all plates. Where plates cross ballast/cargo tank boundaries, separate measurements for the area of plating in way of each type of tank are to be reported.

7.5.5 In all cases the measurements are to represent the average of the multiple measurements taken on each plate and/or stiffener.

7.5.6 Where thickness measurement reveal the need for renewal of plates than the thickness of adjacent plates in the same strake is to be reported.

7.5.7 Where two or three transverse sections are required to be measured at least two should be within 0.5L amidships, and where applicable should be in way of a ballast tank.

7.5.8 The Surveyor may require to measure the thickness of the material in any portion of the structure where signs of wastage are evident or wastage is normally found. The Surveyor may further extend the thickness measurements if deemed necessary. When thickness measurements indicate Substantial Corrosion, the number of thickness measurements is to be increased to determine the extent of Substantial Corrosion as stated in Table 7.2.1-3a.

7.5.9 Upon completion of the thickness measurements on board, the attending Surveyor is to confirm that no further gaugings are needed, or specify additional gauging. The attending Surveyor is also to verify and keep, until review of the final thickness measurement report is completed, a copy of the preliminary thickness measurement report signed by the operator.

A thickness measurement report is to be prepared by a firm whose operators carried out thickness measurements. 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 measuring equipment, names of personnel and their qualifications, and be signed by the operator.

The Surveyor is to review the final thickness measurement report and countersign the cover pages.
7.5.10 The thickness measurements may be specially considered (see 1.2.13), provided the Surveyor is satisfied by the Close-up examination, that there is no structural diminution, and the protective Coating where applied remains efficient.

If extent of thickness measurements has been reduced, the Surveyor’s special consideration is to be reported.

7.5.11 The minimum requirements for thickness measurements are given in 7.2.1.9 and 7.7.2.

7.5.12 Thickness measurements of structures in areas where close-up surveys are required are to be carried out simultaneously with close-up surveys (see 3.2.5).

7.6 CLOSE-UP SURVEY

7.6.1 For initial requirements while determining parts of ship’s structure where Close-up surveys are to be carried out see 3.1.10, and 7.7.4.

7.6.2 The Surveyor may extend the Close-up survey, if deemed necessary, taking into account the maintenance of the tanks under survey, the condition of the corrosion protection system, and also in the following cases:

1. In particular, tanks having structural arrangements or details which have suffered defects in similar tanks or on similar ships.
2. In tanks which have structures approved with reduced scantlings in association with an approved corrosion control system.

7.6.3 For areas in tanks where coatings are found to be in GOOD condition, (as defined in 1.2.10) the extent of Close-up survey may be specially considered by the Register (see 1.2.13).

7.6.4 For bulk carriers with additional character of class GRAB the reinforced area of inner bottom plating, lower part of hopper tank sloping plating and transverse lower stool plating and adjacent associated structures, as applicable, are to be visually examined for possible deformations, fractures or other damage. If deemed necessary, thickness measurement may be required.

7.7 RENEWAL SURVEY ADDITIONAL REQUIREMENTS FOR OIL TANKERS WITH AFFIXED ESP NOTATION OTHER THAN DOUBLE HULL OIL TANKERS

7.7.1 General requirements

7.7.1.1 The survey in accordance with the requirements stated in 4.5, 4.6, 7.2 and 7.4 is to be carried out so far as applicable.

A survey in dry dock is to be a part of the Renewal 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 Renewals 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.

7.7.1.2 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 Close-up survey, thickness measurement and testing as required in 7.7.2 and 7.7.5, to ensure that the structural integrity remains effective.

7.7.1.3 The aim of the examination is to discover substantial corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present. If deemed necessary by the Surveyor, suitable non-destructive examination may be required (see 3.2.6).

7.7.1.4 For oil tankers 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 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.

Where fitted, the strums of the cargo suction pipes are to be removed or lifted to facilitate examination of the shell plating and bulkheads in the vicinity, unless other means for visual inspection of these parts are provided.

7.7.1.5 The survey extent of ballast tanks converted to void spaces is to be specially considered in relation to the requirements for ballast tanks.

7.7.1.6 For tank protection on oil tankers:

Where provided, the condition of the corrosion prevention system of cargo tanks is to be examined. 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 and the hard protective coating is not repaired to the satisfaction of the Surveyor.

Thickness measurements are to be carried out as deemed necessary by the Surveyor.

For areas in tanks where a hard protective coatings are found to be in GOOD condition, the thickness measurements may be specially considered.

7.7.1.7 For oil tankers in addition to aforementioned surveys with the ship in a gas free condition the following is to be examined:

1. Pump room ventilation system, including ducting, dampers and screens and verification of proper operation is to be carried out.

2020
.2 Cargo tank vent pipes and headers from tanks including the devices to prevent the passage of flame on vents (to be dismantled and cleaned).
.3 Cargo tank pressure-vacuum valves to be dismantled and tested for proper operation.
.4 The sealing arrangements of all penetrations of cargo pump room bulkheads and on deck of cargo tanks.
.5 Cargo pump room bilge system, and verification of proper operation is to be carried out.
.6 Proper operation of electrical and mechanical remote operating of cargo, ballast and bilge valves is to be confirmed.
.7 Safe systems used for measurement, monitoring and control are to be examined and their satisfactory operation is to be verified. It is to be confirmed that flexible hoses for supply of water for washing machines are in good condition. At least ten per cent of washing machines is to be opened out and examined.
.8 Emergency towing arrangements on tankers for oil and chemical tankers with DWT ≥ 20,000 are to be thoroughly examined, to ensure ready availability.

7.7.1.8 It is to be confirmed that the crude oil washing system is in accordance with the requirements for such systems and, in particular:
.1 Pressure testing of the crude oil washing system to at least the working pressure is to be carried out.
.2 Cargo tanks are to be examined for the express purpose of verifying the continued effectiveness of the installed crude oil washing and stripping systems.
.3 Isolation valves for any steam heaters are to be examined internally, when fitted.

7.7.1.9 The effectiveness of the crude oil washing system is to be verified by internal tank inspection or by another alternative method acceptable to the Register. If the tank cannot be gas-freed for the safe entry of the Surveyor, an internal inspection should not be conducted. An acceptable alternative would be satisfactory results during the surveys required by 4.5.17.

7.7.2 Thickness measurement requirements for oil tankers

7.7.2.1 For oil tankers and combination carriers the minimum requirements for thickness measurements are given in Table 7.7.2-1. For areas with substantial corrosion (according to 1.2.8) extended thickness measurements in accordance with Table 7.7.2-2 sheet 1 to sheet 4 are to be carried out. 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.

7.7.2.2 The Surveyor may further extend the thickness measurements as deemed necessary. For areas in tanks where hard protective coating are found to be in a GOOD condition, the extent of thickness measurements according to Table 7.7.2-1 may be specially considered. Transverse sections are to be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements. In cases where two or three sections are to be measured, at least one is to include a Ballast Tank within 0.5L amidships.

7.7.2.3 See also 7.5.2.

NOTE: 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.

In case of Oil Tankers of 130 m in length and upwards (as defined in the International Convention on Load Lines in force), and more than 10 years of age, the sampling method of thickness measurements is to be used for longitudinal strength evaluation (see 7.7.2.4). The ship’s longitudinal strength is to be evaluated by using the thickness of structural members measured, renewed and reinforced as appropriate, in accordance with the criteria for longitudinal strength of the ship’s hull girder for oil tankers specified in the Rules, Part 2 – Hull, Annex B. The analysis of data should be carried out and endorsed by the Register and the conclusions of the analysis should form a part of the Executive Hull Summary.

The final result of evaluation of the ship’s longitudinal strength 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.

7.7.2.4 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 7.7.2, 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 7.7.2-1. 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 c) below 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 7.7.2-1.

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 7.7.2-1, 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 d) above, to be measured at each transverse section in accordance with the requirements of Table 7.7.2-1, 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.

.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 given in this annex, the number of transverse sections for thickness measurement should be increased such that each tank within the 0.5L amidships region has been sampled. Tank spaces that are partially within, but extend beyond, the 0.5L region, should be sampled.

b) 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 7.7.2.

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 Register;
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 Register.

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.

7.7.3 Additional renewal survey requirements after determining compliance with SOLAS 74, Ch. XII/12 and XII/13

7.7.3.1 For ships complying with the requirements of SOLAS 74, Ch. XII/12 for hold, ballast and dry space water level detectors, the Renewal survey is to include an examination and a test of the water ingress detection system and of their alarms.

7.7.3.2 For ships complying with the requirements of SOLAS 74, Ch. XII/13 for the availability of pumping systems, the renewal 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.
RULES FOR THE CLASSIFICATION OF SHIPS
PART 1 - CHAPTER 5

7.7.4 Close-up survey requirements for oil tankers

7.7.4.1 An Overall survey of all tanks and spaces, is to be carried out at each Renewal survey, as determined in Table 7.2.1-2.

7.7.4.2 Each Renewal survey is to include a Close-up examination of sufficient extent to establish the condition of the shell frames and their end attachments in all cargo holds and salt water ballast tanks. Close-up survey is to be performed in accordance with the requirements stated in Table 7.7.4-1, for oil tankers and ore/oil ships.

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:

a) In particular, tanks having structural arrangements or details which have suffered defects in similar tanks or on similar ships according to available information.

b) In tanks which have structures approved with reduced scantlings due to an approved corrosion control system.

For areas in tanks or spaces where hard protective coatings are found to be in GOOD condition, the extent of Close-up may be specially considered.

7.7.5 Tank testing requirements for oil tankers

7.7.5.1 Ballast tank testing is to be carried out by mean of hydrostatic pressure test according to Tables 7.2.1-2 and 7.7.5-1, for oil tankers and combination carriers.

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 Register 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 Renewal 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.

7.7.5.2 The Surveyor may extend the tank testing if deemed necessary.

7.8 RENEWAL SURVEY REQUIREMENTS FOR CHEMICAL TANKERS

7.8.1 The requirements of Annex A as well as of 5.7, 6, 7.2, 7.4, 7.5 and 7.6 are to be complied with as applicable.

7.9 ADDITIONAL RENEWAL SURVEY REQUIREMENTS FOR SHIPS WITH INERT GAS SYSTEM FITTED

7.9.1 The requirements of 4.8 are to be complied with.

7.9.2 At each Renewal survey of the inert gas system the following items are to be opened out as considered necessary and examined:

1. The inert gas generator (if fitted).
2. The scrubber.
3. The deck water seal and non-return valve.
4. All valves, including overboard discharge valve of the scrubber.
5. The inert gas blowers.

7.9.3 On completion of survey the complete installation is to be tested under working conditions including testing of all automatic shutdown devices and alarms.

7.9.4 If any examination during 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.

7.10 RENEWAL SURVEY REQUIREMENTS FOR FLOATING UNITS

7.10.1 Following requirements apply to type notations floating dock, floating storage and floating restaurant. The requirements of 4.9 and 6 are to be complied with so far as applicable.

7.10.2 Renewal surveys of hull, equipment and auxiliaries of floating units are to be held every five years (for floating docks see 7.10.4).

7.10.3 In addition to the aforementioned for all floating units the following are to be dealt with so far as applicable:

1. Survey of hull and hull equipment is to be carried out in accordance with requirements of 7.2.
2. Survey of machinery is to be carried out in accordance with requirements of 8.
3. Survey of electrical equipment is to be carried out in accordance with requirements of 11.
4. Survey of automation systems is to be carried out in accordance with requirements of 9.
5. Survey of fire protection arrangements is to be carried out in accordance with requirements of 7.4.
7.10.4 While performing Renewal survey of floating docks in addition to aforementioned requirements the following is to be complied with as applicable:

.1 Renewal surveys for steel and wooden floating docks (irrespective if metal sheathed or not), are to be held every five years and for floating docks built of reinforced concrete (ferro-cement) every ten years.

.2 The dock structure is to be immersed as little as possible.

.3 The structural elements above the waterline are to be inspected both, internally and externally, and the watertight compartments internally only, as far as deemed necessary by the Surveyor.

.4 Piping arranged inside watertight compartments including their valves (inlet and outlet) is to be examined and checked for tightness and operability.

.5 The boundary bulkheads of the watertight compartments are to be surveyed for excessive corrosion, deformation, fractures, damages and other structural deterioration. The compartments are to be air tested with maximum pressure of 0.2 [bar] (0.02 [MPa]) to ascertain the tightness. At least every other compartment is to be tested and the tightness of the whole safety deck is to be tested. The Surveyor may extend the testing if deemed necessary.

.6 Thickness measurements at parts of the dock structure are to be carried out in accordance with requirements given in Table 7.2.1-3 so far as applicable.

.7 Dry-docking or bottom survey with the dock in inclined position is to be restricted to special cases (averages, leakages, etc.) upon agreement between the Company and the Register.

7.11 RENEWAL SURVEY REQUIREMENTS FOR TECHNICAL FLOATING UNITS

7.11.1 Following requirements apply to type notations split hopper barge, dredger and self-unloading hopper barge. The requirements of 4.10, 4.15, 6 and 7.10.3 are to be complied with so far as applicable.

7.11.2 Where surveys are required on dredging or hopper equipment such as gantries, bottom doors and their opening gear, positioning spuds and suction pipe attachments or split hull devices such as actuating and locking devices, these will be limited to the extent considered necessary by the Surveyor to satisfy himself that their condition or malfunction will not adversely affect the ship’s structure.

7.11.3 For technical floating units up to 10 (ten) years old in addition to requirements of 7.11.1 and 7.11.2 the following is to be complied with:

.1 Hoppers are to be cleared and cleaned as necessary and examined.

.2 The integrity of hopper overflows and diluting water inlet and distribution structures is to be confirmed.

.3 Weir valves and sluices are to be tested to ensure proper operation, particular attention being paid to the lower weir, when weirs are fitted at more than one level.

.4 Shell plating in way of hopper overflows is to be carefully examined.

.5 The attachment to the ship’s structure of all main items of dredging equipment, including gantries, “A” frames, spud control gear supports and items provided to facilitate separation of split hulls including hinge pin gudgeons, anchorages for rams and locking devices, is to be carefully examined to ensure that no fracture is present.

.6 For self-unloading hopper barge, visual examination of hopper bottom doors or valves and accessories, such as hinges, actuating rods, hydraulic systems, with dismantling as deemed necessary by the Surveyor.

.7 For split hopper barge (split hopper unit), visual examination, as far as practicable, of superstructure hinges and blocks, deck hinges, hydraulic jacks and associated piping systems and alarms, with dismantling and/or further checks as deemed necessary by the Surveyor.

.8 For dredger, self-unloading hopper barge, split hopper barge:

a) visual examination, as far as practicable, of attachments of suction piping and lifting systems to the structure and external examination of piping in dredging machinery spaces for absence of corrosion and leakage,

b) checking the condition of the dredging machinery space and related equipment with regard to electrical shocks, protection from rotating machinery, fire and explosion hazards.

7.11.4 For technical floating units over 10 (ten) years of age in addition to requirements of 7.11.3 the following is to be complied with:

.1 Structure in way of dredging pumps is to be carefully examined.

.2 Hopper doors, valves and items provided to facilitate separation of split hulls are to be checked for proper operation, and their hinges, control gear and other fittings are to be examined for wear or distortion.

.3 All seals and weardown strips are to be replaced if necessary, but a watertight seal is not normally required.

.4 Areas likely to be suffering from excessive erosion are to be carefully examined.

.5 Those items of dredging gear and equipment whose efficiency is not part of survey, but whose failure or malfunctioning is, nevertheless, likely to adversely affect the ship’s structure, are to be examined to
7.12 RENEWAL SURVEY ADDITIONAL REQUIREMENTS FOR GENERAL DRY CARGO SHIPS

7.12.1 General requirements for hull and hull equipment surveys

7.12.1.1 A survey planning meeting is to be held prior to commencement of the survey. As part of the preparation for renewal survey the thickness measurement is to be dealt with, in advance of the survey. The survey in accordance with the requirements stated in 4.11, 7.2 and 7.4 is to be carried out as far as practicable.

7.12.1.2 A survey in dry dock is to be part of the renewal survey.

7.12.1.3 All cargo holds, salt 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 (see 7.12.2 and 7.12.4), 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.

7.12.1.4 All piping systems within the above spaces are to be examined and tested to working pressure to ensure that the condition remains satisfactory.

7.12.1.5 The survey extent of ballast tanks converted to void spaces is to be specially considered in relation to the requirements for ballast tanks

NOTE: For survey of automatic air pipes see Table 7.2.1-4.

7.12.1.6 Where provided, the condition of the corrosion prevention system of ballast tanks is to be examined. For tanks used for salt water ballast, excluding double bottom tanks, where a hard protective coating (see 1.2.9) is found in POOR condition and it is not renewed or 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 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 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 when extensive corrosion exists, thickness measurements are to be carried out.

Where a hard protective coating in spaces is found to be in GOOD condition, the extent of Close-up surveys and thickness measurements may be specially considered.

7.12.2 Thickness measurement requirements for general dry cargo ships

7.12.2.1 The minimum requirements for thickness measurements at renewal survey are given in Table 7.12.2-1. The requirements of 7.5 are also to be complied with.

7.12.2.2 The Surveyor may extend the thickness measurements as deemed necessary. When thickness measurements indicate substantial corrosion, the number of thickness measurements are to be increased to determine the extent of substantial corrosion. Table 7.2.1-3a may be used as guidance for these additional thickness measurements.

7.12.2.3 For areas in spaces where hard protective coatings are found to be in a GOOD condition, the extent of thickness measurement according to Table 7.12.2-1. may be specially considered.

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

7.12.3 Overall and close-up survey requirements for general dry cargo ships

7.12.3.1 An Overall survey of all tanks and spaces, excluding fuel oil, lube oil and fresh water tanks, is to be carried out at each Renewal survey.

NOTE: For fuel oil, lube oil and fresh water tanks, see Table 7.2.1-2

7.12.3.2 The minimum requirements for close-up surveys at Renewal survey are given in Table 7.12.3-1.

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.

For areas in spaces where hard protective coatings are found to be in a GOOD condition, the extent of close-up surveys according to Table 7.12.3-1 may be specially considered.

NOTE: For survey of automatic air pipes see Table 7.2.1-4

7.12.4 Tank Testing requirements for general dry cargo ships

7.12.4.1 All boundaries of water ballast tanks and deep tanks used for water ballast within the cargo area length are to be pressure tested. For fuel oil tanks, only the representative tanks are to be pressure tested.

7.12.4.2 The Surveyor may extend the tank testing as deemed necessary.

7.12.4.3 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.

7.12.5 Additional renewal survey requirements after determining compliance with SOLAS 74, Ch. II-1/25, for general cargo ships with single hold

7.12.5.1 For ships less than 80 meters in length, or for ships built before 1st July 1998 less than 100 meters in length, with single hold not protected by double hull, requirements of 7.7.3.1 apply.

7.13 RENEWAL SURVEY ADDITIONAL REQUIREMENTS FOR LIVE STOCK CARRIERS

7.13.1 The survey in accordance with the requirements stated in 4.12, 7.2 and 7.4 is to be carried out as far as practicable.

7.13.2 The equipment related to ventilation, lighting and the related power supply is to be submitted to a survey to the same extent as required for similar equipment as indicated in 4.4.2 and 11.2.

7.13.3 The drainage, fodder and fresh water systems, including piping and pumps, are to be surveyed to the same extent as required for similar equipment at the class renewal survey as indicated in 8.3.1 8.7.1 and 8.7.8.

The fresh water tanks are to be internally examined in accordance with the periodicity given in Table 7.2.1-2.

7.13.4 The fire-fighting systems are to be thoroughly examined and tested.

7.14 RENEWAL SURVEY ADDITIONAL REQUIREMENTS FOR FAST VESSELS

7.14.1 High speed craft

Inspection of the structure, machinery safety equipment radio installations any stabilisation systems, air cushion systems and other equipment is to be carried out as far as applicable, to ensure that they are in satisfactory condition and are fit for the service for which the craft is intended for the next five year period and, that no unapproved changes have been made to structure, equipment, fittings, arrangements and materials covered by the survey. The survey includes as far as applicable the following:

.1 inspection of the outside of the craft bottom and thickness measurement on steel craft (for other craft if Surveyor deems it necessary) in accordance with Section 6 and Table 7.2.1-3, with particular attention given to hull appendages (hydrofoils, hydrofoil supports, skirt fixations, shaft brackets, etc.) and to their fixation to the hull and, to the condition of the corrosion protection system of the structure,

.2 inspection of the propeller shafts and propellers in accordance with Section 10;

.3 inspection of the hull and machinery in accordance with 7.2, 7.4 and Section 8 and inspection of automation systems in accordance with section 9.

7.14.2 Dynamically supported craft and Fast craft

Every fifth year the survey in accordance with 7.14.1 is to be carried out as far as applicable.

7.15 RENEWAL SURVEY ADDITIONAL REQUIREMENTS FOR RO-RO CARGO SHIPS, PASSENGER SHIPS, RO-RO PASSENGER SHIPS

Following requirements apply to type notations ro-ro cargo ship, passenger ship, ro-ro passenger ships.
The survey in accordance with the requirements stated in 4.14, 7.2 and 7.4 is to be carried out as far as practicable.

7.15.1 Ro-Ro cargo ships

7.15.1.1 Shell and inner doors

.1 A close visual inspection of structural arrangements is to be carried out, supplemented by non-destructive tests and/or thickness measurements, as deemed necessary by the Surveyor.

.2 The close visual inspection of securing, supporting and locking devices, as required for the annual survey, is to be supplemented by non-destructive tests and/or thickness measurements.

.3 Clearances of hinges, bearings and thrust bearings are to be measured. Dismantling may be required as deemed necessary by the Surveyor.

.4 Non-return valves of drainage arrangements are to be checked after dismantling.

7.15.1.2 Internal platforms and ramps

.1 The condition of pulleys, axles, cables and structure of the platforms and ramps is to be checked, Electric motors and/or hydraulically operated equipment are to be surveyed for the class renewal survey of machinery installations.

7.15.1.3 Fire protection, detection and extinction

.1 Within the scope of survey of fire protection, detection and extinction arrangements as required for the annual survey of all ships in 4.4.2 attention is to be given to the particular arrangements related to Ro-Ro cargo spaces, such as those indicated in 4.14.1.3.
7.15.2 Passenger ships

The following shall apply:

.1 A lightweight survey is to be carried out to verify any changes in lightship displacement and in the longitudinal position of the centre of gravity. Where, in comparison with the approved stability information, a deviation exceeding 2% in the lightship displacement or a deviation of the longitudinal centre of gravity exceeding 1% of the length between perpendiculars is found or anticipated, the ship is to be submitted to a new inclining test.

.2 The condition of the Low Location Lighting (LLL) system, where fitted, and its power source(s) is to be verified.

NOTE: The Register does not require lightweight survey for ships not engaged on international voyages, as in such cases specific requirements of the Flag State Administration shall apply.

7.15.3 Ro-Ro passenger ships

.1 The scope of the annual survey and class renewal survey of Ro-Ro passenger ship is to include the scope of surveys required for the service notations Ro-Ro cargo ship and passenger ships, as detailed in 4.14.3, 7.2.3 and 7.15.2.

.2 In addition to .1, the condition of means of escape as well as of fire protection, detection and extinction in special category spaces is to be checked.

7.16 RENEWAL SURVEY ADDITIONAL REQUIREMENTS FOR TUGS AND SUPPLY VESSELS

Following requirements apply to type notations tug and supply vessel. The survey in accordance with the requirements stated in 4.16, 7.2 and 7.4 is to be carried out as far as practicable.

7.16.1 The survey is to include

.1 checking the condition of the connection of the towing hook or towing winch to the structure, including related reinforcements of the structure.

.2 checking the external condition of the towing hook or towing winch; when applicable, a no-load test of the unhooking device is to be carried out.

.3 for vessels with additional class notation FIR or FIR F, operational testing of the fixed self-protection water-spraying system, the water fire extinguishing systems and/or foam fire-extinguishing systems.

7.17 RENEWAL SURVEY ADDITIONAL REQUIREMENTS FOR FISHING VESSELS

The survey in accordance with the requirements stated in 4.16, 7.2 and 7.4 is to be carried out as far as practicable.

7.17.1 For fishing vessels 10 years age and over, the class renewal survey is to include thickness measurements of structural elements prone to rapid wastage, such as the stern ramp, weather deck in way of the working area of the nets, connections to hull structure of masts, gantries, winches and traw gallows (for side trawlers).
Table 7.2.1-1
Preparation for survey

<table>
<thead>
<tr>
<th>I Renewal survey</th>
<th>II Renewal survey</th>
<th>III Renewal survey and all subsequent surveys</th>
</tr>
</thead>
<tbody>
<tr>
<td>(age ≤ 5)</td>
<td>(5 &lt; age ≤ 10)</td>
<td>(age &gt; 10)</td>
</tr>
</tbody>
</table>

1. In machinery spaces as well as in the pump rooms platform plates are to be lifted as may be necessary for the examination of the structure, bilge suction, piping and fittings below such plates. Special consideration is to be given to the condition of the structure adjacent to the boilers as well to the condition of the double bottom tanks below such boilers.

2. In ships having a single bottom in every watertight compartment 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, bilge suction, piping and fittings below to be examined.

3. 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.

4. Where holds are insulated for the purpose of carrying refrigerated cargoes a sufficient amount of limbers and hatches is to be removed to enable the framing and plating in way to be examined.

1. The requirements for the I Renewal survey are to be fulfilled.
2. 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 deems it necessary, the whole of the ceiling is to be removed.
3. Wood decks or sheathing are to be examined. If decay or rot is found or the wood is excessively worn, the wood is to be renewed. Attention is to be given to the condition of the plating under wood decks, sheathing or other deck covering.
4. The chain locker is to be cleaned internally before the survey commences. Wood sheathing from the chain locker is to be removed in order to enable the structure below to be examined.

1. The requirements for the II Renewal survey are to be fulfilled.
2. Ceiling in holds is to be removed in order to ascertain that the steelwork is in good condition, free from rust and coated. If the Surveyor is satisfied, after removal of portions of ceiling then it need not be removed completely.
3. 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.
4. Casings or covers of air, sounding, steam and other pipes, spar ceiling and lining in way of side scuttles are to be removed, as required by the Surveyor.

**NOTES:**
In cases where the inner surface of the bottom plating is covered with cement, asphalt, or other composition, the removal of this covering may be dispensed with, provided that it is inspected, tested by beating or chipping, and found sound and adhering satisfactorily to the steel.
Table 7.2.1-2

Tank internal examination and testing requirements - all ships

For additional internal examination requirements for oil tankers see 7.7.1.2
For additional requirements for tank testing on oil tankers see Table 7.7.5-1
For additional internal examination requirements for chemical tankers see 2.2.1.2 of Annex A

<table>
<thead>
<tr>
<th>Tank</th>
<th>I Renewal survey (age ≤ 5)</th>
<th>II Renewal survey (5 &lt; age ≤ 10)</th>
<th>III Renewal survey (10 &lt; age ≤ 15)</th>
<th>IV Renewal survey and all subsequent surveys (age &gt; 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt water ballast</td>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td>Fuel Oil bunker tanks:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Engine room</td>
<td>None</td>
<td>None</td>
<td>One</td>
<td>One</td>
</tr>
<tr>
<td>- Cargo Length area</td>
<td>None</td>
<td>One</td>
<td>Two</td>
<td>Half, minimum 2</td>
</tr>
<tr>
<td>- If no tanks in Cargo Length Area, addi-</td>
<td>None</td>
<td>One</td>
<td>One</td>
<td>Two</td>
</tr>
<tr>
<td>tional fuel tank(s) outside of Engine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Room (if fitted)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lubricating oil</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>One</td>
</tr>
<tr>
<td>Fresh water</td>
<td>None</td>
<td>One</td>
<td>All</td>
<td>All</td>
</tr>
</tbody>
</table>

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 renewal survey, on a rotational basis.
3) Peak tanks (all uses) are subject to internal examination at each renewal survey.
4) At Renewal surveys no 3 and subsequent surveys, one deep tank for fuel oil in the cargo length area is to be included, if fitted.
5) 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. 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.
Table 7.2.1-3
Minimum requirements for thickness measurement - all ships
For additional requirements for oil tankers with affixed ESP notation see Table 7.7.2-1 or Table II, Annex B, for chemical tankers see Table II, Annex A, for bulk carriers see Table II, Annex C1, and for general dry cargo ships see Table 7.12.2.1

<table>
<thead>
<tr>
<th>I Renewal survey (age ≤ 5)</th>
<th>II Renewal survey (5 &lt; age ≤ 10)</th>
<th>III Renewal survey (10 &lt; age ≤ 15)</th>
<th>IV Renewal survey and all subsequent surveys (age &gt; 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Suspect areas, throughout the ship.</td>
<td>1. Suspect areas, throughout the ship. 2. One transverse section of deck plating in way of a cargo space within the amidships 0,5L.</td>
<td>1. Suspect areas, throughout the ship. 2. Two transverse sections within the amidships 0,5L in way of two different cargo spaces. 3. All cargo hatch covers and coamings (plating and stiffeners). 4. Internals in forepeak and afterpeak ballast tanks.</td>
<td>1. Suspect areas, throughout the ship.</td>
</tr>
</tbody>
</table>

NOTES:
For thickness measurements reporting, the standard forms as proposed by IACS may be used, as appropriate. The forms are a recommendation and are not a mandatory requirement.

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 meters in length, the number of transverse sections required at Renewal survey No. III may be reduced to one, and the number of transverse sections required at subsequent Renewal surveys may be reduced to two.
4) For ships more than 100 meters in length, at Renewal survey No. III, thickness measurements of exposed deck plating within amidship 0,5L 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.
6) Thickness measurements are to be taken on transverse sections where biggest wastage is expected.
Minimum requirements to thickness measurements in way of substantial corrosion - all types of ships except oil tankers, chemical tankers, ore/bulk/oil ships, ore/oil ships and bulk carriers

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plating</td>
<td>Suspect area and adjacent plates.</td>
<td>5 point pattern over one square meter.</td>
</tr>
<tr>
<td>Stiffeners</td>
<td>Suspect area.</td>
<td>3 measurements each in line across web and flange.</td>
</tr>
</tbody>
</table>

---

**Table 7.2.1-4**

Survey requirements for automatic air pipe heads

<table>
<thead>
<tr>
<th>I Renewal survey</th>
<th>II Renewal survey</th>
<th>III Renewal survey and all subsequent surveys</th>
</tr>
</thead>
<tbody>
<tr>
<td>(age ≤ 5)</td>
<td>(5 &lt; age ≤ 10)</td>
<td>(age &gt; 10)</td>
</tr>
<tr>
<td>1. Two (see NOTES) air pipe heads, one port and one starboard, located on the exposed decks in the forward 0.25 L, preferably air pipes serving ballast tanks.</td>
<td>1. All air pipe heads located on the exposed decks in the forward 0.25 L. 2. At least 20% (see NOTES) of air pipe heads, on the exposed decks serving spaces aft of 0.25 L, preferably air pipes serving ballast tanks.</td>
<td>1. All air pipe heads located on the exposed decks. Exemption may be considered for air pipe heads where there is substantiated evidence of replacement within the previous five years.</td>
</tr>
<tr>
<td>2. Two (see NOTES) air pipe heads, one port and one starboard, on the exposed decks, serving spaces aft of 0.25 L, preferably air pipes serving ballast tanks.</td>
<td>1) 2)</td>
<td>3)</td>
</tr>
<tr>
<td>1) 2)</td>
<td>1) 2)</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

1) The selection of air pipe heads to be inspected is left to the attending Surveyor.
2) 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 substantial evidence of replacement after the last renewal survey.
Table 7.7.2-1

Minimum additional requirements to thickness measurement - Oil tankers with affixed ESP notation

<table>
<thead>
<tr>
<th>I Renewal survey (age ≤ 5)</th>
<th>II Renewal survey (5 &lt; age ≤ 10)</th>
<th>III Renewal survey (10 &lt; age ≤ 15)</th>
<th>IV Renewal survey and all subsequent surveys (age &gt; 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Suspect areas.</td>
<td>1. Suspect areas.</td>
<td>1. Suspect areas.</td>
<td>1. Suspect areas.</td>
</tr>
<tr>
<td>2. One section of deck plat-</td>
<td>2. Within the cargo area:</td>
<td>2. Within the cargo area:</td>
<td>2. Within the cargo area:</td>
</tr>
<tr>
<td>ing for the full beam of the ship within the cargo area (in a way of a ballast tank, if any, or a cargo tank used primarily for the water ballast).</td>
<td>a) each deck plate,</td>
<td>b) each deck plate,</td>
<td>a) each deck plate,</td>
</tr>
<tr>
<td>3. Selected wind and water strakes outside the cargo area.</td>
<td>b) one transverse section.</td>
<td>b) two transverse sections.</td>
<td>b) three transverse sections.</td>
</tr>
<tr>
<td>4. Measurements, for general assessment and recording of corrosion pattern of those structural members subject to Close-up survey according to Table 7.7.4-1</td>
<td>c) all wind and water strakes.</td>
<td>c) all wind and water strakes.</td>
<td>c) each bottom plate.</td>
</tr>
<tr>
<td>5. All wind and water strakes, full length.</td>
<td>4. Measurements, for general assessment and recording of corrosion pattern of those structural members subject to Close-up survey according to Table 7.7.4-1.</td>
<td>3. All wind and water strakes, full length.</td>
<td>3. All wind and water strakes, full length.</td>
</tr>
<tr>
<td>6. Measurements, for general assessment and recording of corrosion pattern of those structural members subject to Close-up survey according to Table 7.7.4-1.</td>
<td>4. Measurements, for general assessment and recording of corrosion pattern of those structural members subject to Close-up survey according to Table 7.7.4-1.</td>
<td>4. Measurements, for general assessment and recording of corrosion pattern of those structural members subject to Close-up survey according to Table 7.7.4-1.</td>
<td>4. Measurements, for general assessment and recording of corrosion pattern of those structural members subject to Close-up survey according to Table 7.7.4-1.</td>
</tr>
</tbody>
</table>

NOTES:
1) Where two or three transverse sections are required to be measured, at least one is to include a Ballast tank within 0.5L amidships.
2) Transverse sections are to be chosen where the largest reductions are likely to occur, or as revealed by deck plating measurement.

Table 7.7.2-2 sheet 1

Requirements for extent of thickness measurement at those areas of Substantial Corrosion - Oil tankers with affixed ESP notation

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom plating</td>
<td>Minimum of three bays* across tank, including aft bay.</td>
<td>5 point pattern for each panel** between longitudinals and webs.</td>
</tr>
<tr>
<td></td>
<td>Measurement around and under all bell mouths.</td>
<td></td>
</tr>
<tr>
<td>Bottom longitudinals</td>
<td>Minimum of 3 longitudinal in each bay where bottom plating measured.</td>
<td>3 measurement in line across flange and 3 measurement on vertically web.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottom girders and brackets</td>
<td>At fore and aft transverse bulkhead, bracket toes and in centre of tanks.</td>
<td>Vertical line of single measurements on web platting with 1 measurement between each panel stiffener, or a minimum of 3 measurements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 measurements across face flat.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 point pattern on girder / bulkhead brackets.</td>
</tr>
<tr>
<td>Bottom transverse webs</td>
<td>3 webs in bays where bottom plating measured, with measurements at both ends and middle.</td>
<td>5 point pattern over 2 square metre area. Single measurements on face flat.</td>
</tr>
<tr>
<td>Panel stiffening</td>
<td>Where provided.</td>
<td>Single measurements.</td>
</tr>
</tbody>
</table>

NOTES:
* Bay is an area between two bottom transverses, or between a bottom transverse and a transverse bulkhead.
** Panel denotes area between two longitudinals limited by transverses or by bulkheads.
### Table 7.7.2-2 sheet 2
Requirements for extent of thickness measurement at those areas of Substantial Corrosion - Oil tankers with affixed ESP notation – within the cargo tank length

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck plating</td>
<td>Two bands across tank.</td>
<td>Minimum of three measurements per plate per band.</td>
</tr>
<tr>
<td>Deck longitudinals</td>
<td>Minimum of 3 longitudinals in each of two bays.</td>
<td>3 measurements in line vertically on webs and 2 measurements on flange (if fitted).</td>
</tr>
<tr>
<td>Deck girders and brackets</td>
<td>At fore and aft transverse bulkhead, bracket toes and in centre of tanks.</td>
<td>Vertical line of single measurements on web plating with 1 measurement between each panel stiffener, or a minimum of 3 measurements. 2 measurements across face flat. 5 point pattern on girder / bulkhead brackets.</td>
</tr>
<tr>
<td>Deck transverse webs</td>
<td>Minimum of 2 webs with measurement at middle and both ends of span.</td>
<td>5 point pattern over about 2 square metre areas. Single measurements on face flat.</td>
</tr>
<tr>
<td>Panel stiffening</td>
<td>Where provided.</td>
<td>Single measurements.</td>
</tr>
</tbody>
</table>

### Table 7.7.2-2 sheet 3
Requirements for extent of thickness measurement at those areas of Substantial Corrosion - Oil tankers with affixed ESP notation – within the cargo tank length

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deckhead and bottom strakes and strakes in way of stringer platforms</td>
<td>Plating between each pair of longitudinals in minimum of 3 bays.</td>
<td>Single measurement.</td>
</tr>
<tr>
<td>All other strakes</td>
<td>Plating between every 3rd pair of longitudinals in same 3 bays.</td>
<td>Single measurement.</td>
</tr>
<tr>
<td>Longitudinals-deckhead and bottom strakes</td>
<td>Each longitudinal in same 3 bays.</td>
<td>3 measurements across web and 1 measurement on flange.</td>
</tr>
<tr>
<td>Longitudinals-all others</td>
<td>Every third longitudinal in same 3 bays.</td>
<td>3 measurements across web and 1 measurement on flange.</td>
</tr>
<tr>
<td>Longitudinals-brackets</td>
<td>Minimum of three at top, middle and bottom of tank in same 3 bays.</td>
<td>5 point pattern over area of bracket.</td>
</tr>
<tr>
<td>Web frames and cross ties</td>
<td>3 webs with minimum of three locations on each web, including in way of cross tie connections.</td>
<td>5 point pattern over about 2 square metre area, plus single measurements on web frame and cross tie face flats.</td>
</tr>
</tbody>
</table>
Table 7.7.2-2 sheet 4
Requirements for extent of thickness measurement at those areas of Substantial Corrosion - Oil tankers with affixed ESP notation - within the cargo tank length

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Deckhead and bottom strakes and strakes in way of stringer platforms</strong></td>
<td>Plating between pair of stiffeners at three locations, i.e. approximately at 1/4, 1/2 and 3/4 width of tank.</td>
<td>5 points pattern between stiffeners over 1 meter length.</td>
</tr>
<tr>
<td><strong>All other strakes</strong></td>
<td>Plating between pair of stiffeners at middle location.</td>
<td>Single measurement.</td>
</tr>
<tr>
<td><strong>Strakes in corrugated bulkheads</strong></td>
<td>Plating for each change of scantling at centre of panel and at flange or fabricated connection.</td>
<td>5 point pattern over about 1 square metre of plating.</td>
</tr>
<tr>
<td><strong>Stiffeners</strong></td>
<td>Minimum of 3 typical stiffeners.</td>
<td>For web, 5 point pattern over span between bracket connections (2 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.</td>
</tr>
<tr>
<td><strong>Brackets</strong></td>
<td>Minimum of three at top, middle and bottom of tank.</td>
<td>5 point pattern over areas of bracket.</td>
</tr>
<tr>
<td><strong>Deep webs and girders</strong></td>
<td>Measurements at toe of bracket and at centre of span.</td>
<td>For web, 5 point pattern over about 1 square metre. 3 measurements across face flat.</td>
</tr>
<tr>
<td><strong>Stringer platforms</strong></td>
<td>All stringers with measurements at middle and both ends.</td>
<td>5 point pattern over about 1 square metre of area plus single measurements near bracket toes and on face flats.</td>
</tr>
</tbody>
</table>
Table 7.7.4-1
Minimum requirements to Close-up survey - oil tankers with affixed ESP notation

<table>
<thead>
<tr>
<th>I Renewal survey</th>
<th>II Renewal survey</th>
<th>III Renewal survey</th>
<th>IV Renewal survey and all subsequent surveys</th>
</tr>
</thead>
<tbody>
<tr>
<td>(age ≤ 5)</td>
<td>(5 &lt; age ≤ 10)</td>
<td>(10 &lt; age ≤ 15)</td>
<td>(age &gt; 15)</td>
</tr>
</tbody>
</table>

1. **One web frame ring** (see A) in a wing ballast tank, if any, or a cargo wing tank used primarily for water ballast.
2. **One deck transverse** (see B) in a cargo oil tank.
3. **One transverse bulkhead** (see D):
   a) in a ballast tank,
   b) in a cargo wing tank,
   c) in a cargo oil center tank.

1. **All web frame rings** (see A) in a wing ballast tank, if any, or a cargo wing tank used primarily for water ballast.
2. **One deck transverse** (see B):
   a) in each of the remaining ballast tanks, if any,
   b) in cargo wing tank,
   c) in two cargo center tanks.
3. **Both transverse bulkheads** (see C) in a wing ballast tank, if any, or a cargo wing tank used primarily for water ballast.
4. **One transverse bulkhead** (see D):
   a) in each remaining ballast tank,
   b) in a cargo oil wing tank,
   c) in two cargo center tanks.

1. **All web frame rings** (see A):
   a) in all ballast tanks,
   b) in a cargo wing tank.
2. A **minimum of 30% of all web frame rings** (see A and Note 1) in each remaining cargo wing tank.
3. **All transverse bulkheads** (see C) in all cargo and ballast tanks.
4. A **minimum of 30% of deck and bottom transverses** (see E) including adjacent structural members in each cargo centre tank.
5. The extent of survey can be expanded as considered necessary by the Surveyor.

NOTES:
A) Complete transverse web frame ring including adjacent structural members.
B) Deck transverse including adjacent deck structural members.
C) Transverse bulkheads complete, including girder system and adjacent members.
D) Transverse bulkhead lower part including girder system and adjacent structural members.
E) Deck and bottom transverse including adjacent structural members.
F) Additional transverse web frame ring.

See sketches in Annex D for areas corresponding to (A), (B), (C), (D), (E) and (F).

**NOTE 1:**
The 30% is to be rounded up to next whole integer.
### Table 7.7.5-1
Minimum additional requirements to tank testing - oil tankers

<table>
<thead>
<tr>
<th>I Renewal survey (age ≤ 5)</th>
<th>II Renewal survey and Subsequent (age &gt; 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. All ballast tank boundaries.</td>
<td>1. All ballast tank boundaries.</td>
</tr>
<tr>
<td>2. Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, representative fuel oil tanks, pump rooms or cofferdams.</td>
<td>2. All cargo tank boundaries</td>
</tr>
</tbody>
</table>

**NOTES:**

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

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

---

### Table 7.12.2-1
Minimum additional requirements to thickness measurement – general dry cargo ships

<table>
<thead>
<tr>
<th>I Renewal survey (age ≤ 5)</th>
<th>II Renewal survey (5 &lt; age ≤ 10)</th>
<th>III Renewal survey (10 &lt; age ≤ 15)</th>
<th>IV Renewal survey and all subsequent surveys (age &gt; 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Suspect areas.</td>
<td>1. Suspect areas.</td>
<td>1. Suspect areas.</td>
<td>1. Suspect areas.</td>
</tr>
<tr>
<td>2. One transverse section of deck plating abreast a cargo space within the amidships 0.5L.</td>
<td>2. Two transverse sections within the amidships 0.5L, abreast of two different cargo spaces.</td>
<td>3. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table 7.12.3-1.</td>
<td>3. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table 7.12.3-1.</td>
</tr>
<tr>
<td>3. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table 7.12.3-1.</td>
<td>4. Within the cargo length area, each deck plate outside line of cargo hatch openings.</td>
<td>4. Within the cargo length area: a) A minimum of three transverse sections within the amidships 0.5L.</td>
<td>4. All wind and water strakes full length.</td>
</tr>
<tr>
<td>5. All wind and water strakes within the cargo length area.</td>
<td>6. Selected wind and water strakes outside the cargo length area.</td>
<td>b) Each deck plate outside line of cargo hatch openings.</td>
<td></td>
</tr>
<tr>
<td>6. Selected wind and water strakes outside the cargo length area.</td>
<td>7. Each bottom plate, including lower turn of bilge.</td>
<td>c) Each bottom plate, including lower turn of bilge.</td>
<td></td>
</tr>
<tr>
<td>8. Duct keel or pipe tunnel plating and internals.</td>
<td>9. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table 7.12.3-1.</td>
<td>d) Duct keel or pipe tunnel plating and internals.</td>
<td></td>
</tr>
<tr>
<td>10. All wind and water strakes full length.</td>
<td>11.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 Renewal survey No. 3 may be reduced to one and the number of transverse sections at Renewal Survey No. 4 and subsequent-surveys may be reduced to two.
Table 7.12.3-1
Minimum requirements to Close-up survey – at hull renewal surveys of general dry cargo ships

<table>
<thead>
<tr>
<th>I Renewal survey</th>
<th>II Renewal survey</th>
<th>III Renewal survey</th>
<th>IV Renewal survey and all subsequent surveys</th>
</tr>
</thead>
<tbody>
<tr>
<td>(age ≤ 5)</td>
<td>(5 &lt; age ≤ 10)</td>
<td>(10 &lt; age ≤ 15)</td>
<td>(age &gt; 15)</td>
</tr>
<tr>
<td>(A) Selected shell frames in one forward and one aft cargo hold and associated 'tween deck spaces.</td>
<td>(A) Selected shell frames in all cargo holds and 'tween deck spaces.</td>
<td>(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.</td>
<td>(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 Renewal survey No. III</td>
</tr>
<tr>
<td>(B) One selected cargo hold transverse bulkhead.</td>
<td>(B) One transverse bulkhead in each cargo hold.</td>
<td>(B) All cargo hold transverse bulkheads.</td>
<td></td>
</tr>
<tr>
<td>(D) All cargo hold hatch covers and coamings (plating and stiffeners).</td>
<td>(C) One transverse web with associated plating and framing in two representative water ballast tanks of each type (i.e. topside, hopper side, side tank or double bottom tank).</td>
<td>(B) All transverse bulkheads in ballast tanks, including stiffening system.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(D) All cargo hold hatch covers and coamings (plating and stiffeners).</td>
<td>(D) All cargo hold hatch covers and coamings (plating and stiffeners).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(E) Selected areas of all deck plating and underdeck structure inside line of hatch openings between cargo hold hatches</td>
<td>(E) All deck plating and underdeck structure inside line of hatch openings between cargo hold hatches</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(F) Selected areas of inner bottom plating</td>
<td>(F) All areas of inner bottom plating.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(A) Cargo hold transverse frames</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(B) Cargo hold transverse bulkheads plating, stiffeners and girders</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(C) Transverse web frame or watertight transverse bulkhead in water ballast tanks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(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 part of hatch cover structures.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(E) Deck plating inside line of hatch openings between cargo hold hatches</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(F) Inner bottom plating.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See sketches in Annex D for areas corresponding to (A), (B), (C), (D), (E) and (F)

NOTES:
Close-up survey of transverse bulkheads is to be carried out at the following levels:
Level (a) – Immediately above the inner bottom and immediately above the 'tween decks, as applicable.
Level (b) – Mid-height of the bulkheads for holds without 'tween decks.
Level (c) – Immediately below the main deck plating and 'tween deck plating.
8 RENEWAL SURVEY REQUIREMENTS FOR MACHINERY

For Annual and Docking surveys see 4 and 6.

8.1 INTENTIONALLY LEFT BLANK

8.2 PROPULSION SYSTEM - SURVEY REQUIREMENTS

8.2.1 The following parts are to be opened out and examined: cylinders with their liners, pistons, piston rods, crossheads, guides, connecting rods, crankshafts and all bearings, crankcases, valves and valve gear, crankcase door fastenings and explosion relief devices, scaveng relief devices, scavenger pumps, scavenger blowers, air compressors and their intercoolers, filters and/or separators and safety devices, fuel pumps and fittings, camshaft drives and balancer units, flexible couplings, clutches, reverse gears, attached pumps and cooling arrangements, superchargers and their associated coolers, vibration dampers or de-tuners.

8.2.2 Bedplates and holding down bolts and chocks of main and auxiliary engines are to be examined.

8.2.3 Selected pipes in the starting air system are to be removed for internal examination and are to be hammer and hydraulically tested. Some of the pipes selected are to be those adjacent to the starting air valves at the cylinders and the discharge from the air compressors.

8.2.4 Initial starting arrangements including the electric ignition system, if fitted are to be tested. The manoeuvring of engines is to be tested under working conditions.

8.2.5 Propeller shafts and propellers are to be surveyed in accordance with the requirements of 10.

8.2.6 Intermediate shafts, thrust shaft, thrust block and all bearings are to be examined. The lower halves of bearings need not be exposed if alignment and wear are found to be acceptable.

8.3 AUXILIARY MACHINERY - SURVEY REQUIREMENTS

8.3.1 Sea water pumps, fire pumps, bilge and ballast pumps are to be opened out and examined. All safety devices for the aforementioned items are to be examined.

8.3.2 Screw and gear pumps as well as centrifugal and reciprocating pumps of systems other than those mentioned 8.3.1 are to be examined under working conditions, including check of stand-by arrangements, safety and signalling devices and so far as possible pressure and capacity.

8.3.3 Air compressors with their inter-coolers and safety devices and steam operated evaporators and their safety valves are to be opened up and examined, and tested under working conditions.

8.3.4 Main and auxiliary steering machinery, hydraulic pumps, safety devices, mechanical and hydraulic control devices are to be examined and tested under working conditions.

8.3.5 Anchoring and mooring windlass are to be examined, including operational check, check of the brake and testing of safety devices.

8.3.6 Condensers, steam re-heaters and super-heaters which are not incorporated in the boilers are to be examined and if it is considered necessary they are to be hydrostatically tested to 1.5 times their maximum working pressure (never less than 1 bar above the working pressure).

8.3.7 For survey of pressure vessels (air receivers, hydrofors, oil and feed water heaters including their safety devices) see 8.10.

8.3.8 All safety devices are to be examined in opened out conditions.

8.3.9 The extent of examination for prime movers and auxiliary machinery such as generators, pumps, compressors etc. is to be decided by the Surveyor taking into account of the type and general condition of prime mover, number of working hours and results of testing under conditions.

8.4 REDUCTION GEAR AND CLUTCHES - SURVEY REQUIREMENTS

8.4.1 Reduction gearing is to be opened and examined as considered necessary by the Surveyor in order to confirm the condition of the gears, pinions, shafts, bearings and lubrication system.

8.4.2 Bearing wear-down and gear teeth wear-down as well as gear-tooth contact are to be examined.

8.4.3 Rubber and friction parts of clutches are to be examined.

8.4.4 Reverse gear is to be tested under working conditions.
8.5 TURBINES - SURVEY

8.5.1 Main and auxiliary turbines are to be opened and examined including nozzles, rotor with blading, bearings, stationary blading interstage packing and gland seals with oil barriers. Axial and radial clearance is to be measured.

8.5.2 Fastenings of turbine casings covers and turbine foundation arrangements are to be examined.

8.5.3 Operational test of the turbines is to be carried out if deemed necessary by the Surveyor.

8.5.4 Control gear, starting and reversing arrangements, safety and signalling devices are to be examined.

8.5.5 Condensers and their cooling water and condensate extraction pumps, flexible couplings and steam filter are to be examined.

8.5.6 The extent of examination for turbine supplying power to generator is to be decided by the Surveyor taking into account general condition of turbine, number of working hours, bearing clearances and results of testing under working conditions.

8.5.7 Where the propulsion steam turbines are of a well-known type, and fitted with rotor position indicators and vibration indicators of an approved type, as well as measuring equipment of steam pressure at proper locations along the steam flow, and the arrangements for change over in case of emergency operation of the plant are readily operable, the first Renewal survey may be limited to the examination of rotor bearings, thrust bearings and flexible couplings, provided the Surveyor has been satisfied from operation service records and power trials subsequent to the survey, that the turbine plant is in good working condition.

8.5.8 Turbine casings should be opened at the next Renewal survey and subsequent Renewal surveys.

8.6 BOILERS - SURVEY

8.6.1 Water tube boilers used for main propulsion, including reheat boilers, all other boilers of essential service, and boilers of non-essential service having working pressure exceeding 3.5 bar and a heating surface exceeding 4.5 m², are to be surveyed internally twice in every five year period. The period between surveys will not exceed three (3) years.

At each survey, the boilers, superheaters, and economizers are to be examined internally on water-steam side and fire side. Boiler mountings and safety valves are to be examined at each survey and opened out as considered necessary by the Register.

When direct visual internal inspection is not feasible due to the limited size of the internal spaces, such as for small boilers and/or narrow internal spaces, this may be replaced by a hydrostatic pressure test or by alternative verifications as determined by the Register.

An extension of examination of the boiler of up to 3 months beyond the due date can be granted in exceptional circumstances (see the Rules, Part 1 - General requirements, Ch. 1 - General information, 5.5.1). An extension may be granted by the Register after the following is satisfactorily carried out:

1. External examination of the boiler.
2. Boiler safety valve relieving gear (easing gear) is to be examined and operationally tested.
4. Review of the following records since the last boiler survey: operation, maintenance, repair history and feedwater chemistry.

Boilers should be suitably prepared for the examination and water-steam side and fire side are to be cleaned so as to permit careful examination. If due to construction of boiler the complete internal examination is not practicable, hydrostatic testing is to be carried out as agreed with the Register.

8.6.2 Review of the following records since the last boiler survey is to be carried out as part of the survey: operation, maintenance, repair history and feedwater chemistry. The results of visual inspection by the Surveyor may require non-destructive examinations for detection of possible defects and thickness measurements of platings and shells, furnaces and tubes to be carried out.

Upon such examination results, the appropriate working pressure of the boiler is to be fixed in agreement with the Register.

8.6.3 External survey of boilers is to be carried out annually in the course of the annual survey of a ship. External examination of boiler, superheater and economiser including all relevant fittings, insulation, supports and fastening arrangements is to be carried out under working conditions.

8.6.4 Superheaters and economisers are to be examined internally (water-steam side) and externally (fire side). The principal mountings are to be internally examined with particular regard to studs for securing the valve bodies to boiler shell, and the remaining mountings may be only externally examined at the discretion of the Surveyor.

Safety valves are to be adjusted to lift at a pressure 1.03 to 1.05 times the working pressure.

8.6.5 The oil fuel burning system is to be examined under working conditions, fuel tank valves and pipes, and oil piping between pumps and burners are to be generally examined.

8.6.6 All safety, control and signalling devices are to be examined and tested so far as practicable.

8.6.7 Safety valves for auxiliary boilers may be adjusted at sea on the responsibility of the Chief Engineer (see 2.3.2). Such operation is to be recorded in the log book for the purpose of subsequent ascertainment by the Surveyors.

8.7 PIPING AND PIPING ARRANGEMENT - SURVEY

8.7.1 All piping systems used for essential services are to be examined and tested under working conditions including pipe joints, expansion joints, valves, cocks, flexible pipes and rubber connections and safety devices.
8.7.2 Filters and some selected pipes of oil fuel and lubrication oil systems are to be opened up and examined.

8.7.3 The valves, cocks and strainers of the bilge system, including emergency suction system in engine room are to be opened up as considered necessary by the Surveyor and together with pipes, are to be examined and tested under working conditions.

8.7.4 For compressed air pipes see 8.2.3.

8.7.5 For steam pipes see 8.8.

8.7.6 All remote controls for valves are to be tested.

8.7.7 Hydraulic oil control system filters are to be opened up and examined and piping tested under working conditions.

8.7.8 During tank surveys particular attention is to be paid to fresh water and ballast piping passing through cargo and bunker tanks and oil fuel, cargo and lubricating piping passing through ballast and fresh water tanks.

Where considered necessary by the Surveyor piping systems may require to be tested under working conditions

8.7.9 Where on piping systems mentioned in 8.7.8 pipe joints are inside tank, hydrostatic test with maximum working pressure is to be carried out at every Renewal survey.

8.7.10 Fuel tanks which do not form part of the ship's structure are to be examined and if considered necessary by the pressure specified for new tanks. The tanks need not to be examined internally at first survey if they are found satisfactory on external inspection.

8.7.11 The mountings, fittings and remote controls of all oil fuel tanks are to be examined so far as practicable.

8.7.12 For existing ships, having GT $\geq$ 500, navigating in navigation areas 1 to 4 and for all new ships, the protection of main and auxiliary engines high pressure fuel pipes is to be checked during the first survey of any kind and re-checked on Renewal surveys.

8.8 STEAM PIPES - SURVEY REQUIREMENTS

8.8.1 At each survey a selected number of main steam pipes, also of auxiliary steam pipes which are over 76 [mm] external diameter and 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, the remainder need not to be tested. So far as is practicable the pipes are to be selected for examination and hydraulically tested in rotation, so that in the course of surveys all sections of the pipeline will be tested

8.8.2 Where steam pipes described in 8.8.1 have instead of bolted, welded joint between the lengths of pipe and/or between pipes and valves, the welds are to be 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.

8.8.3 Steam pipes in tanks are to be examined and hydraulically tested so far as practicable.

8.8.4 Condition of insulation is to be examined, and if considered necessary by the Surveyor partial or complete re-newal of insulation may be required.

8.9 HEAT TRANSFER DEVICES - SURVEY REQUIREMENTS

8.9.1 Internal examination and tightness testing of the heater tubes to not less than working pressure is to be carried out.

8.9.2 Control and safety devices are to be checked.

8.9.3 Hydraulic examination is to be carried out according to agreement with the Register.

8.10 PRESSURE VESSELS - SURVEY REQUIREMENTS

8.10.1 All air receivers for essential services are to be cleaned internally and examined internally and externally, once every five years. If internal examination is not practicable the examination by non-destructive means and/or hydrostatic testing to the test pressure marked on the vessel or 1.3 times the working pressure is to be carried out as considered necessary by the Surveyor.

8.10.2 Subject to the results of visual inspection the Surveyor may require non-destructive examinations for detection of possible defects and thickness measurements of plating to be carried out. Upon such examination results, the appropriate working pressure of the pressure vessel is to be fixed in agreement with the Register.

8.10.3 Mountings, valves and safety devices are to be opened up and examined.

8.10.4 Safety devices are to be tested to 1.1 times the working pressure.

8.10.5 At least 10 % of all CO2 bottles are to be internally examined and hydraulically tested at intervals not exceeding 10 (ten) years.

Halon containers of existing fixed Halon fire-extinguishing systems are exempted from this requirement.

Irrespective thereof, on the occasion of recharging CO2 bottles and Halon containers are to be tested, if the last test dates back 10 (ten) years or more;

If the total loss of CO2 or Halon bottle content is greater than 10 % of the original quantity, the bottles in question should be recharged, internally examined and if found necessary hydraulically tested (the value of pressure test is marked on the bottle) according to the requirements in 7.4.2.

Following a hydraulic pressure test, the bottles/containers are to be carefully dried. Records from inspection/testing of pressure vessels are to be kept onboard.

NOTE: In the case when the Flag State Administration requirements differ from aforementioned, then specific requirements of the Administration shall be applied.
8.11 REQUIREMENTS FOR TESTING OF PERMANENTLY INSTALLED BREATHING GAS CONTAINERS ONBOARD DIVING VESSELS

8.11.1 At the first Renewal survey the following is to be performed:
   .1 External and internal survey, by intrascope if necessary.
   .2 If internal survey is not possible or if corrosion or other items of concern are found, hydraulic test to 1.25 of the design pressure.

8.11.2 At all subsequent Renewal surveys the following is to be performed:
   .1 External and internal survey, by intrascope if necessary.
   .2 Hydraulic test to 1.25 of the design pressure.
9 SURVEY OF THE AUTOMATION SYSTEMS

9.1 GENERAL

9.1.1 For ships having periodically unattended machinery space and complying to the requirements of the Rules (see the Rules, Part 13 - Automation), the Register may assign one of the following additional characters of class: AUT 1, AUT 2 or AUT 3 (see the Rules, Part 1 – General requirements, Ch. 1 – General information, 4.3).

9.1.2 On ships built after 1st July 2002, with class notation AUT 1 an approved stamped copy of systematic “Maintenance and testing program for automation system” is to be kept onboard and presented at annual and renewal surveys.

9.2 ANNUAL SURVEY REQUIREMENTS

9.2.1 Requirements of the Annual survey are stated in 4.4.1.7

9.3 RENEWAL SURVEY REQUIREMENTS

9.3.1 Survey of the automation systems for ships having additional character of class AUT 1

9.3.1.1 Automatic synchronising and load sharing in case of overload of the generator at work are to be tested.

9.3.1.2 Officer on duty alarm is to be tested at each location where the alarm (visual or audible) shall be transferred.

9.3.1.3 Sequential re-starting of essential machinery (propulsion, steering and safety of the ship) after generator blackout is to be tested.

9.3.1.4 Automatic start-up of all standby machinery is to be checked.

9.3.1.5 Bilge level alarms at the bridge main control station and accommodation area are to be tested.

9.3.1.6 Machinery safety alarm system warning faults in machinery, as well as machinery remote control from the bridge are to be checked under working conditions or by simulation if possible including checking of communication means and signalling devices at navigation bridge and main control station.

9.3.1.7 Automation of electric generating plant is to be checked including automatic starting of electric generating sets and their sequential connection to the main switchboard busbars, and remote starting of the prime movers of electric generating plant from the main control station, including checking of their safety systems.

9.3.1.8 Engine room alarm system is to be checked for correct functioning by simulation so far as possible.

9.3.1.9 Monitoring system at main control station as well as remote starting and stopping of all pumps serving main and auxiliary machinery are to be checked for correct functioning.

9.3.1.10 Dead man alarm is to be tested.

9.3.1.11 For ships built after 1st July 2002, at annual and renewal survey, Surveyor is to examine and verify approved “Maintenance and testing program for automation system”.

9.3.2 Survey of the automation systems for ships having additional character of class AUT 2

9.3.2.1 The survey of the automation systems for ships having additional character of class AUT 2 is to consist of requirements listed from 9.3.1.6 to 9.3.1.10.

9.3.3 Survey of the automation systems for ships having additional character of class AUT 3

9.3.3.1 The survey of the automation systems for ships having additional character of class AUT 3 is to consist of requirements of 9.3.1 for systems fitted on board.
10 PROPELLER AND PROPELLER SHAFT SURVEY

For vessels delivered before 1st January 2016, the following requirements apply until the first shaft survey on or after 1st January 2016. After that, 10.6 applies.

10.1 FREQUENCY OF SURVEYS

If the Society with which the vessel is dually classed applies different intervals for shaft drawing the Register may apply the required interval of that Society.

10.1.1 Shafts having approved continuous liners or approved oil glands, or made of approved corrosion resistant materials, where the propeller is fitted to the shaft by means of approved: coupling flange or with keyed or keyless type attachments are to be completely surveyed at intervals of five years.

10.1.2 Other shafts fitted with continuous liners or made of approved corrosion resistant materials are to be completely surveyed at intervals not exceeding: three years for ships having single shaft arrangement, four years for ships having multi-shaft arrangements.

The interval for drawing may be raised:

i) from three to a maximum of five years for single shafting arrangements, or

ii) from four to a maximum of five years for multi-shafting arrangements, in any of following cases:

a) where the propeller is fitted to a keyed shaft taper the design details of which are approved, and a non-destructive examination is made at each survey by an approved crack-detection method of the after end of the cylindrical part of the shaft (from the after end of the liner, if any), and of about one third of the length of the taper from the large end, or

b) where the propeller is fitted to a solid flange coupling at the aft end of the shaft, the shaft and its fittings are not exposed to corrosion, the design details are approved. Non-destructive examination of the fillet radius of the aft propeller shaft flange may be required if the visual examination of the area is not satisfactory or

c) where the propeller is fitted keyless to the shaft taper, the shaft is protected from seawater, the design details are approved, and a non-destructive examination is made at each survey by approved crack-detection method of the forward part of the aft shaft taper or

d) for propeller fitted on ships not engaged in international voyages (area of navigation 5 to 8).

10.1.3 Controllable pitch propellers are to be surveyed at the same intervals as the propeller shafts where they are fitted.

10.1.4 Special propulsion systems, such as rotating thrusters, vertical axis propellers and water jet units for main propulsion purposes as well as athwartship thrust propellers are to be completely surveyed at intervals not exceeding five years.

10.1.5 All other shafts are to be surveyed at intervals not exceeding 2.5 years (+/- six months).

10.1.6 For survey intervals see also Table 10.1-1.

10.2 COMPLETE SURVEY

10.2.1 Unless alternative means are provided to assure the condition of the shaft all propellers shafts are to be sufficiently withdrawn to permit entire examination and following is to be examined:

.1 The after end of the cylindrical part of the shaft and forward one third of the shaft cone (in the case of the keyed propeller attachments the key is to be removed), or fillet of the flange (in case of shafts having solid coupling flanges at the after end) is to be examined by a surface crack-detection method such as magnetic particle or dye penetrant. Where the propeller is fitted to a solid flange coupling at the aft end of the shaft non-destructive examination of the fillet radius of the aft propeller shaft flange may be required if the visual examination of the area is not satisfactory.

.2 Shafts are to be carefully examined throughout, particularly in way of the thread for the propeller nut, at the keyway, at the large end of the cone, at the ends of the liner(s) where in contact with seawater, at the junctions of the separate lengths of a liner, at the portion of shaft between separate lengths of liners and in way of couplings and their bolt holes.

.3 Propeller shaft bearings are to be examined.

.4 Parts of the stern tube oil gland (if fitted) are to be examined.

.5 Propellers, including fastenings and securing arrangements are to be examined.

.6 Clearance measurement of the propeller shaft bearings are to be carried out.

.7 Tightness test of the stern tube oil glands is to be carried out.

.8 Controllable pitch propellers where fitted are to be opened up and the working parts examined, together with the control gear.

10.2.2 Where the notation PMON has been assigned, the propeller shaft need not be withdrawn at complete survey under the following conditions:

.1 All exposed areas of the shaft are to be satisfactorily examined by a surface crack-detection method. The crack detection test of the aft flange fillet area may be dispensed with for the solid flange coupling fitted at the end of the shaft. Where the propeller is fitted keyless to the shaft taper the crack detection test is to be carried out at intervals not exceeding 15 years.
Clearance of the aft sterntube bearing is to be checked and weardown is to be acceptable.

External examination of oil glands and propeller including fastenings and securing arrangements is to be satisfactory carried out.

All condition monitoring data, as requested in 10.7, are to be found documented on board and within permissible limits.

Where the Surveyor considers that the data presented is not entirely to his satisfaction the shaft will be required to be withdrawn.

10.2.3 Rotating thrusters are to be subject to survey consisting of:

.1 removing the propeller in order to examine as applicable: exposed parts, cone and keyway (to be checked using dye penetrant or magnetic particle method), sealing glands and threaded end nut,

.2 examining the results of a lub-oil analysis (see 10.5), to detect possible deterioration of internal gears and bearings,

.3 examining the orientation device, as applicable.

Where the Surveyor considers that aforementioned checks and data presented are not satisfactory, dismantling of the internal parts may be required.

10.2.4 Vertical axis propellers are to be subject to survey consisting of:

.1 checking the tightness of the oil glands and the backlash of the gears from outside by action on the blades;

.2 checking the condition of gears and couplings from inside the ship;

.3 examining the results of a lub-oil analysis (see 10.5), to detect possible deterioration of internal gears and bearings.

Where the Surveyor considers that aforementioned checks and data presented are not satisfactory, dismantling of the internal parts may be required.

10.2.5 Water jet systems are to be subject to survey consisting of:

.1 examining the impeller, shaft and clearances of bearings;

.2 checking the tightness of gland;

.3 examining the water duct, aft deflector and its mechanism.

Where the Surveyor considers that aforementioned checks are not satisfactory, further dismantling may be required.

10.2.6 Athwartship thrust propellers are to be subject to survey consisting of:

.1 checking the tightness of the oil glands and the backlash of the gears from outside by action on the blades,

.2 checking the condition of gears and couplings from inside the ship,

.3 examining the results of a lub-oil analysis (see 10.5), to detect possible deterioration of internal gears and bearings.

Where the Surveyor considers that aforementioned checks and data presented are not satisfactory, dismantling of the internal parts may be required.

10.3 MODIFIED SURVEY

10.3.1 Modified survey is applicable to the shafts described in 10.1.1 where oil glands are capable of being replaced without removal of the propeller.

10.3.2 Modified survey is accepted at alternate 5 (five) yearly surveys, provided that the clearances of the aft bearing are found in order and the oil and oil sealing arrangements have proved effective after the survey stated in 10.3.3. The due interval for complete survey in this case is 10 (ten) years.

10.3.3 The Modified survey is to consist of:

.1 The partial withdrawal of the shaft, sufficient to ascertain the condition of the stern bearing and shaft in way of the propeller connection to the shaft.

.2 Examination of fore bearing so far as is possible.

.3 For keyed propellers, the after and of the cylindrical part of the shaft cone is to be examined by a surface crack-detection method (see 10.2.1.1), for which dismantling of the propeller and removal of the key will be required.

.4 Measurement of the clearance/weardown of the aft sterntube bearing.

.5 Checking of the condition and efficiency of the oil sealing glands.

.6 Examination of propellers, including fastenings and securing arrangements.

.7 Controllable pitch propellers are to be subject to check of tightness in way of blade glands and distribution box, check of analyses of hydraulic oil, and to working test, as far as practicable, of the blade manoeuvring. Where the Surveyor considers that the data presented are not entirely to his satisfaction, further dismantling may be required.

10.3.4 Where the notation PMON has been assigned and all condition monitoring data, as requested in 10.7, are found documented on board and within permissible limits, partial withdrawal of the shaft need not be required at modified survey.

Where doubt exists regarding any of the above findings the shaft is to be withdrawn to permit an entire examination.

10.4 PARTIAL SURVEY

10.4.1 For propeller shafts where the Modified survey is applicable, upon application by the Company, the Register will be prepared to give consideration to postponement of the survey for a maximum period of half the specified cycle provided a Partial Survey is held.

10.4.2 The Partial survey is to consist of:

.1 The propeller being backed off in any keyed shaft and the top half of the cone
RULES FOR THE CLASSIFICATION OF SHIPS

PART 1 - CHAPTER 5

examine by an efficient surface crack-detection method for which removal of the key will be required.

.2 The external examination of the oil gland sealing.

.3 Measurement of the clearance/weardown of the aft stern tube bearing.

.4 Examination of propellers, including fastenings and securing arrangements.

10.4.3 The Register will be prepared to give consideration to the circumstances of any special case upon application by the Company.

10.5 DETERMINATION OF METALS AND OTHER CONTAMINANTS IN STERN TUBE LUBRICANTS

10.5.1 Determination of metals and other contaminants in stern tube lubricating oil

10.5.1.1 Where lubrication oil analysis is carried out, each analysis is to be performed by an appropriate method and should include the minimum parameters as follows:

.1 Water contents.
.2 Chloride contents.
.3 Contents of bearing metal particles.
.4 Oil ageing (resistance to oxidation).

10.5.1.2 Oil samples should be taken under service conditions, i.e. with a rotating shaft and the system at service temperature. These samples, unless supervised by the Surveyor, are to be collected and identified by the Chief Engineer.

10.5.1.3 The contents of the following metals should be determined:

.1 In connection with contents of wear metals:
   a) chromium,
   b) copper,
   c) iron,
   d) lead,
   e) nickel,
   f) silicon,
   g) tin.

.2 In connection with contents of sea water:
   a) magnesium,
   b) sodium.

10.5.1.4 The metal and water content values should be considered taking into account the type of seals used and the chemicals composition of the bearing material.

Suggested upper limits are given below for guidance only:

<table>
<thead>
<tr>
<th>Component</th>
<th>Upper Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>1%</td>
</tr>
<tr>
<td>chromium</td>
<td>10 ppm</td>
</tr>
<tr>
<td>copper</td>
<td>50 ppm</td>
</tr>
<tr>
<td>iron</td>
<td>30 ppm</td>
</tr>
<tr>
<td>lead</td>
<td>10 ppm</td>
</tr>
<tr>
<td>chloride content</td>
<td>70 ppm (ingress of salt water)</td>
</tr>
<tr>
<td>nickel</td>
<td>10 ppm</td>
</tr>
<tr>
<td>silicon</td>
<td>40 ppm</td>
</tr>
<tr>
<td>tin</td>
<td>10 ppm</td>
</tr>
<tr>
<td>magnesium</td>
<td>80 ppm</td>
</tr>
<tr>
<td>sodium</td>
<td></td>
</tr>
</tbody>
</table>

These limits should be considered versus the elapsed time.

It is important to have results of a number of sequential analysis in order to observe any trends taking place.

10.5.1.5 Oil ageing – Oxidation characteristics such as TAN (total acid number) depend upon the type of oil used. Hence no recommended value is listed. Instead observation of any trends (such as viscosity and change in colour etc.) based on sequential analysis should be made.

10.5.1.6 Other analysis - Microscopic analysis of the particles may be recommended to identify the failure process and, where applicable, non-metallic bearing or seal material.

10.5.2 Determination of metals and other contaminants in a closed fresh water system lubricated stern tube

10.5.2.1 Where lubricating fresh water analysis is carried out, each analysis is to be performed by an appropriate method and should include the minimum parameters as listed:

.1 Metal contents as applicable (with the material of the shaft and liners used), refer to 10.5.2.3 and 10.5.2.4,
.2 Corrosion inhibitors in fresh water (pH or equivalent alkalinity indicators) indicating the degree of passivation of the system against corrosion, refer to 10.5.2.5,
.3 Salinity indicators or equivalent indicators i.e. total conductivity, refer to 10.5.2.3 and 10.5.2.6,
.4 Contents of bearing particles, refer to Section 10.5.2.7.

Analysis result records should also include the extent of make-up water in the system.

10.5.2.2 Sampling procedure

One lubricating fresh water sample should be taken:

.1 The fresh water sample should be taken under service conditions, i.e. with a rotating shaft and the system at service temperature,
.2 The sample is to be drawn from the same agreed position in the system which should be positively identified. The sample should be representative of the water circulating within the stern tube,
.3 The sample, unless supervised by a Surveyor, is to be collected under the direct supervision of the Chief Engineer.

10.5.2.3 Contaminants determination

The presence of the following contaminants should be determined:

.1 In connection with presence of wear metals and corrosion products (shaft and/or liners):
   a) iron,
   b) chromium,
   c) nickel,
   d) copper,
   e) silicon.

.2 In connection with presence of sea water:
   a) sodium,
b) chlorides.

10.5.2.4 Metal content values

The metal content values should be considered taking into account the chemical composition of the shaft and liner materials.

Suggested upper limits are given below for guidance only:

<table>
<thead>
<tr>
<th>Metal</th>
<th>Limit value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>25ppm</td>
</tr>
<tr>
<td>Chromium</td>
<td>5ppm</td>
</tr>
<tr>
<td>Nickel</td>
<td>5ppm</td>
</tr>
<tr>
<td>Copper</td>
<td>40ppm</td>
</tr>
<tr>
<td>Silicon</td>
<td>30ppm</td>
</tr>
</tbody>
</table>

These limits should be considered versus the elapsed time.

It is important to have results of a number of sequential analyses in order to observe any trends taking place.

In case of shafts provided with a corrosion protection system the possible presence of further metal contaminants should be evaluated in accordance to the indications of the shaft/system manufacturer.

10.5.2.5 Corrosion inhibitors

The fresh water used for shaft lubrication may be treated, according to the provisions of the system manufacturer, by means of corrosion inhibitors that limit the risk of oxidation of the shaft and/or liners. The characteristics and contents of such inhibitors may vary, hence no recommended value is listed.

However, a significant indicator that may be used as guidance is the pH value of the sample or an equivalent indicator of alkalinity. The lower limit of the pH value of the water that may be assumed as guidance is 11.

10.5.2.6 Salinity indicators

In order to evaluate the possible contamination of the fresh water with salt water (e.g. leakages from the outboard seals) the following indicators should be considered:

1. Chloride contents,
2. Sodium.

Suggested upper limits are given below for guidance only:

<table>
<thead>
<tr>
<th>Chloride contents</th>
<th>60ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium</td>
<td>70ppm</td>
</tr>
</tbody>
</table>

10.5.2.7 Presence of bearing particles

The bearings used in fresh water lubricated propulsion shaft are made of synthetic material and could have composite structure consisting of specifically selected polymers and additives having mineral or synthetic origin.

The possible presence of synthetic material in the fresh water sample may indicate the deterioration of the bearing or onset of bearing failure.

Mechanical filtering of the water sample, e.g. by means of a paper micro-filter, may allow a first quantitative analysis of the content of macro parts. This shall be taken before the filters if any fitted in the system.

Microscopic analysis of the particles may be recommended to identify the non-metallic bearing material in the sample.
**Table 10.1-1**

Frequency of surveys for propellers and propeller shafts

<table>
<thead>
<tr>
<th>SYSTEM/PART OF THE SHIP</th>
<th>SURVEY</th>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>type</td>
<td>due date (years)</td>
</tr>
<tr>
<td>PROPELLERS</td>
<td>see note</td>
<td></td>
</tr>
<tr>
<td>- With fixed blades</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- With removable blades</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- With controllable pitch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Rotating thrusters for main propulsion purposes</td>
<td>Complete</td>
<td>5</td>
</tr>
<tr>
<td>- Vertical axis propellers for main propulsion purposes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Water jet units for main propulsion purposes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Athwartship thrust propellers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PROPELLER SHAFTS:**

*EXPLANATION:* Year stated in the diagram below denotes the due year of the Complete survey

* Complete survey is to be held within six months before or after the due date in order to harmonise with the Docking survey

- Propeller shafts in accordance with approved documentation:
  - with oil lubricated bearings and efficient oil glands, or
  - shafts fitted with continuous liners or systems considered equivalent, or
  - shafts made of corrosion resistant material

- Connection of propeller, according to approved documentation:
  - keyless onto shaft taper, or
  - keyed onto shaft taper, or
  - solid flange coupling

- Shaft fitted with oil lubricated bearings and efficient sealing gland, according to approved documentation

- New oil seals may be fitted without removal of the propeller (except in the case of keyed propeller) – see also requirements of 10.2.2.4

**Diagram:**

- Yes
- No
- 2.5 years
- 3 years
- 4 years
- 5 years
- 10 years
- 7.5 years

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>2.5 years*</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
<td>3 years</td>
</tr>
<tr>
<td>NO</td>
<td>YES</td>
<td>4 years</td>
</tr>
<tr>
<td>NO</td>
<td>YES</td>
<td>5 years</td>
</tr>
<tr>
<td>YES</td>
<td>NO</td>
<td>10 years</td>
</tr>
<tr>
<td>YES</td>
<td>NO</td>
<td>7.5 years</td>
</tr>
</tbody>
</table>

5 years Partial survey performed
10.6 SURVEYS OF PROPELLER SHAFTS AND TUBE SHAFTS

10.6.1 General

10.6.1.1 Application

Unless alternative means are provided to assure the condition of the propeller shaft assembly, these require-
ments apply to all vessels with conventional shafting fitted with a propeller as follows:
- from 1st January 2016 for ships delivered or after 1st January 2016;
- after the first shaft survey scheduled on or after 1st January 2016, for ships delivered before 1st January 2016 *).

NOTE: *) 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 Tables of Survey Intervals in 10.6.2 and 10.6.3.

10.6.1.2 Definitions

See also Diagram 1.

Shaft - For the purpose of this Section shaft is a general definition that could mean:
- 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.

Propeller Shaft - is the part of the propulsion shaft to which the propeller is fitted. It may also be called screwshaft or tailshaft.

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.

Sterntube - Tube or pipe fitted in the shell of a ship at the stern (or rear part of the ship), below the waterline, 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.

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.

Water Lubricated Bearing - is a bearing cooled / lubricated by water (fresh or salt).

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.

Open Systems (water) - Open water lubricating systems use water to lubricate the bearings and are exposed to the environment.

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 layer of fiberglass;
- combinations of above mentioned;
- rubber / elastomer covering coating.

The means for protection against corrosion are installed / applied according to class approved procedures.

Corrosion Resistant Shaft - is made in approved corrosion resistant steel as core material for the shaft.

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.

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).

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.

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.

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).
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.

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.

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.

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.

Diagram 1 - Typical Shafting Arrangement

10.6.2 Oil Lubricated shafts or Closed Loop System Fresh Water Lubricated Shafts (closed system)

SHAFT SURVEY METHODS

10.6.2.1 Method 1
The survey is to consist of:

.1 Drawing the shaft and examining the entire shaft, seals system and bearings

.2 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 key-way (if fitted). For shaft provided with liners the NDE shall extended to the after edge of the liner.

.3 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.

.4 Checking and recording the bearing clearances.

.5 Verification that the propeller is free of damages which may cause the propeller to be out of balance.

.6 Verification of the satisfactory conditions of inboard and outboard seals during the re-installation of the shaft and propeller.

.7 Recording the bearing weardown measurements (after re-installation).

10.6.2.2 Method 2
The survey is to consist of:

.1 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 key-way (if fitted).

.2 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.

.3 Checking and recording the bearing weardown measurements.

.4 Visual Inspection of all accessible parts of the shafting system.
.5 Verification that the propeller is free of damages which may cause the propeller to be out of balance.
.6 Seal liner found to be or placed in a satisfactory condition.
.7 Verification of the satisfactory reinstallation of the propeller including verification of satisfactory conditions of inboard and outboard seals.

Pre-requisites to satisfactorily verify in order to apply Method 2:
.1 Review of service records.
.2 Review of test records of:
   - Lubricating Oil analysis (for oil lubricated shafts), or
   - Fresh Water Sample test (for closed system fresh water lubricated shafts).
.3 Oil sample Examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).
.4 Verification of no reported repairs by grinding or welding of shaft and/or propeller.

10.6.2.3 Method 3
The survey is to consist of:
.1 Checking and recording the bearing weardown measurements.
.2 Visual Inspection of all accessible parts of the shafting system.
.3 Verification that the propeller is free of damages which may cause the propeller to be out of balance.
.4 Seal liner found to be or placed in a satisfactory condition.
.5 Verification of the satisfactory conditions of inboard and outboard seals.

Pre-requisites to satisfactorily verify in order to apply Method 3:
.1 Review of service records.
.2 Review of test records of:
   - Lubricating Oil analysis (for oil lubricated shafts), or
   - Fresh Water Sample test (for closed system fresh water lubricated shafts).
.3 Oil sample Examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).
.4 Verification of no reported repairs by grinding or welding of shaft and/or propeller.

SHAFT EXTENSION SURVEYS - EXTENSION TYPES

10.6.2.4 Extension up to 2.5 years
The survey is to consist of:
.1 Checking and recording the bearing weardown measurements, as far as practicable.
.2 Visual Inspection of all accessible parts of the shafting system.
.3 Verification that the propeller is free of damages which may cause the propeller to be out of balance.
- Fresh Water Sample test (for closed system fresh water lubricated shafts).

.4 Oil sample Examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).

.5 Verification of no reported repairs by grinding or welding of shaft and/or propeller.

.6 Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

OIL LUBRICATED SHAFTS

10.6.2.7 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.

.1 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).

.2 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 shall not exceed 15 years.

10.6.2.8 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 “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.

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.

10.6.2.9 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.

.1 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).

.2 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).

.3 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).

10.6.2.10 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 re
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 10.6.2 - Survey Intervals (closed systems)

<table>
<thead>
<tr>
<th>SURVEY INTERVALS (closed systems)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OIL LUBRICATED</strong></td>
</tr>
<tr>
<td>Flanged Propeller Coupling</td>
</tr>
<tr>
<td>Method 1 or Method 2 or Method 3</td>
</tr>
<tr>
<td>Extension 2,5 years</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Extension 1 year</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Extension 3 months</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td><strong>CLOSED LOOP SYSTEM FRESH WATER LUBRICATED</strong></td>
</tr>
<tr>
<td>Flanged Propeller Coupling</td>
</tr>
<tr>
<td>Method 1 or Method 2 or Method 3</td>
</tr>
<tr>
<td>Extension 2,5 years</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Extension 1 year</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Extension 3 months</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td><strong>GENERAL NOTES:</strong></td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td><strong>NOTES:</strong></td>
</tr>
<tr>
<td>a: unless an Extension type (Extension 2.5 years, Extension 1 year, Extension 3 months) is applied in between.</td>
</tr>
<tr>
<td>b: Method 3 not allowed.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>d: no more than one extension can be granted. No further extension of other type can be granted.</td>
</tr>
<tr>
<td>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.</td>
</tr>
<tr>
<td>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” can be granted. No further extension, of other type, can be granted or 2.5 years.</td>
</tr>
<tr>
<td>g: The maximum interval between two surveys carried out according to Method 1 shall not be more than 15 years.</td>
</tr>
</tbody>
</table>
10.6.3 Water Lubricated shafts (open systems)

SHAFT SURVEY METHODS

10.6.3.1 Method 4

The survey is to consist of:

1. Drawing the shaft and examining the entire shaft (including liners, corrosion protection system and stress reducing features, where provided), inboard seal system and bearings.

2. 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.

3. 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.

4. Checking and recording the bearing clearances.

5. Verification that the propeller is free of damages which may cause the propeller to be out of balance.

6. Verification of the satisfactory conditions of inboard seal during re-installation of the shaft and propeller.

SHAFT EXTENSION SURVEYS – EXTENSION TYPES

10.6.3.2 Extension up to 1 year

The survey is to consist of:

1. Visual Inspection of all accessible parts of the shafting system.

2. Verification that the propeller is free of damages which may cause the propeller to be out of balance.

3. Checking and recording the clearances of bearing.

4. Verification of the effectiveness of the inboard seal.

Pre-requisites to satisfactorily verify in order to apply extension up to 1 year:

1. Review of the previous clearance recordings.

2. Service records.

3. Verification of no reported repairs by grinding or welding of shaft and/or propeller.

4. Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

10.6.3.3 Extension up to 3 months

The survey is to consist of:

1. Visual Inspection of all accessible parts of the shafting system.

2. Verification that the propeller is free of damages which may cause the propeller to be out of balance.

3. Verification of the effectiveness of the inboard seal.

Pre-requisites to satisfactorily verify in order to apply extension up to 3 months:

1. Review of the previous clearance recordings.

2. Service records.

3. Verification of no reported repairs by grinding or welding of shaft and/or propeller.

4. Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

SHAFT SURVEY INTERVALS

10.6.3.4 Survey Intervals

The following survey intervals between surveys according to Method 4 are applicable to all types of propeller connections.

1. 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.

2. For surveys completed within 3 months before the shaft survey due date, the next period will start from the shaft survey due date.

10.6.3.4.1 Configurations allowing 5 year intervals

1. Single shaft operating exclusively in fresh water.

2. Single shaft provided with adequate means of corrosion protection, single corrosion resistant shaft.

3. All kinds of multiple shafts arrangements.

10.6.3.4.2 Other systems

Shaft not belonging in one of the configurations listed in 10.6.3.4.1 has to be surveyed according to Method 4 every 3 years.

10.6.3.5 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 exten-
sion” 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 10.6.3 - Survey Intervals (open systems)

<table>
<thead>
<tr>
<th>Survey Intervals (open systems)</th>
<th>Other shaft configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>- Single Shaft operating exclusively in Fresh Water</strong></td>
<td></td>
</tr>
<tr>
<td><strong>- Single Shaft provided with adequate means of corrosion protection, Single corrosion resistant shaft</strong></td>
<td></td>
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<tr>
<td><strong>- All kinds of Multiple shafts arrangements</strong></td>
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<tr>
<td>All kinds of Propeller Coupling d</td>
<td>All kinds of Propeller Coupling d</td>
</tr>
<tr>
<td>Every five years a</td>
<td>Method 4</td>
</tr>
<tr>
<td>Extension 1 year</td>
<td>Extension 1 year</td>
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<tr>
<td>Yes b</td>
<td>Yes b</td>
</tr>
<tr>
<td>Extension 3 months</td>
<td>Extension 3 months</td>
</tr>
<tr>
<td>Yes c</td>
<td>Yes c</td>
</tr>
</tbody>
</table>

**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 year, Extension 3 months) 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.
10.7 PROPELLER SHAFT CONDITION MONITORING (PMON)

10.7.1 The additional class notation PMON is assigned for propeller shaft arrangements fitted in accordance with requirements as stated in the Rules, Part 7 - Machinery installation, 2.9. The assignment of PMON class notation allows a reduced scope for complete (see 10.2) and modified (see 10.3) propeller shaft survey.

10.7.2 Propeller shaft condition monitoring data system shall be established on board and the following condition monitoring data are to be found documented onboard and within permissible limits:

1. **Lubricating oil analysis:** The stern tube lubricating oil analysis shall be carried out by a recognized laboratory, at regular intervals not exceeding six months. Testing is to be conducted for the parameters and under conditions stated in 10.5.1. Stern tube lubricating oil is to be tested and recorded monthly for water content by means of onboard test kit or recognized laboratory.

2. **Oil consumption:** The system’s oil consumption shall be monitored and recorded monthly.

3. **Bearing temperature:** Stern tube bearing temperatures with corresponding seawater temperatures are to be monitored and recorded monthly.

All records are to be confirmed by a Chief Engineer and available to Surveyor for examination.

10.7.3 For maintenance of the class notation PMON following examination shall be performed annually:

1. Examination of record file with condition monitoring data collected, as stated in 10.7.2.

2. Testing of stern tube aft bearing temperature alarm and another propeller shaft monitoring equipment, as applicable.

3. Visual inspections of inner and outer shaft seal for leakage, as far as practicable.

4. If any overhauls were performed, complete oil changes or similar, this shall be recorded in record file.
11 ELECTRICAL EQUIPMENT

11.1 ANNUAL AND INTERMEDIATE SURVEYS

11.1.1 The requirements for the Annual survey stated in 4, and the requirements for the Intermediate Survey stated in 5 are to be complied with as far as applicable.

11.2 COMPLETE SURVEYS

11.2.1 All sources of electric power are to visually examined. The following items are to be functionally tested, insulation resistance is to be measured, and they are to be opened out if deemed necessary by the Surveyor:
   .1 Main sources of electric power.
   .2 Shaft generators.
   .3 Emergency sources of power.
   .4 For rectifiers and batteries only functional testing is to be carried out.

NOTE: Measured insulation resistance between all insulated circuits and earth is to be not less than 1000 Ohm per Volt of nominal voltage.

11.2.2 Where the ship is electrically propelled the following items are to be functionally tested, insulation resistance is to be measured, (see NOTE in 11.2.1) and they are to be opened out if deemed necessary by the Surveyor:
   .1 Generators of the propulsion system.
   .2 Propulsion motors.
   .3 Ventilating plant (including cooling for tiristor rectifiers).
   .4 Control and regulating devices.

11.2.3 Electric power distribution system is to be examined, consisting of insulation resistance measurements (see also NOTE in 11.2.1):
   .1 Examination of the main switchboard, comprising examination of related components, measurement of the insulation resistance, functional testing, control of the parallel work and over current protective devices.
   .2 Examination of the emergency switchboard, comprising examination of related components, measurement of the insulation resistance, functional testing, as well as the control of the its automatic change-over and safety devices.
   .3 Examination of the distribution boards of navigational and signalling lights, comprising visual examination, measurement of the insulation resistance and functional testing.
   .4 Examination of all other distribution boards, comprising visual examination, measurement of the insulation resistance and functional testing.
   .5 Examination of the cables connecting generators and main switchboard, comprising visual examination of the cable outer covering, cable-runs, passages and penetrations, interconnections, and measurement of the insulation resistance.

11.2.4 Electromotive drives, are to be examined consisting of measurement of the insulation resistance (see also NOTE in 11.2.1), and:
   .1 Examination of the electromotive drives concerned with essential services is to be carried out as it is stated in the Rules, Part 12 - Electrical equipment, 4.3.
   .2 Visual inspection of all other electromotive drives is to be carried out, including measurement of the insulation resistance and functional testing in extent as deemed necessary by the Surveyor.

11.2.5 Examination of lighting armatures and lighting fittings for the following items:
   .1 Lighting of the emergency lighting.
   .2 Lighting in the areas essential for the ship’s operation. In all other areas lighting is to be visually inspected, taking into account that detail inspection of such lighting may be requested if deemed necessary by the Surveyor.

11.2.6 Electrical equipment and installations in hazardous areas are to be examined in accordance with the requirements stated in the Rules, Part 12 - Electrical equipment, 19.2.4. In addition to this the following is to be performed:
   .1 Examination of the lighting conductors.
   .2 Examination of cable outer covering.
   .3 Examination of cable glends, joint boxes and expansion connections.
   .4 Examination of cable penetrations through the bulkheads and decks.
   .5 Examination of the insulation-testing instruments.
   .6 Measurement of the insulation resistance in inert-gas conditions. (see also NOTE in 11.2.1).
   .7 Confirming that the type and design of the equipment comply with the approved documentation.
   .8 Examination in the pressurised enclosure, including alarm devices and interlocking in the case of low pressure.

11.2.7 Examination of the alarms (visual and audible) and safety devices, including functional testing is to be carried out for the following items:
   .1 Main propulsion system.
   .2 System of the main sources of electric power.
   .3 System of emergency sources of electric power.
   .4 Controllable pitch propeller system.
   .5 Steering gear system.
   .6 Insulation-testing instruments.
.7 Watertight doors.

11.2.8 Examination of other arrangements comprises:

1 Functional testing of internal communication circuits.

2 Functional testing of the engine telegraph.

3 Functional testing of the incinerator.

4 Visual inspection and insulation resistance measurement of the heating equipment. (see also NOTE in 11.2.1).

5 Control of spare parts in accordance with the requirements stated in the Rules, Part 12 - Electrical equipment, 21.

11.3 SURVEYS OF ELECTRICAL EQUIPMENT DURING DOCKING SURVEY

11.3.1 For tankers for oil, ships for ore/bulk/oil and ships for ore/oil five years old and over, 11.2 is to be complied with. In addition, the requirements stated in 6.2.1.6 are to be fulfilled.
12 REFRIGERATING PLANT

12.1 ANNUAL SURVEY REQUIREMENTS

12.1.1 Maintenance records are to be examined to verify that the refrigerating machinery has functioned satisfactorily since the previous Annual survey.

If the records are showing that refrigerating machinery operating parameters or refrigerant consumption are exceeding acceptable tolerances, appropriate action is to be taken in response of such malfunction.

12.1.2 All refrigerated cargo spaces are to be checked visually. For that purpose, such spaces are to be thoroughly cleaned and cleared, especially in normally inaccessible parts.

12.1.3 The refrigerating machinery is to be checked in operation. During this check, the delivery and discharge temperatures at the air coolers and at the brine coolers respectively, the temperatures of the refrigerated cargo spaces, or refrigerated cargo containers, of the ambient air, the cooling water inlet and outlet, the refrigerant in the condenser and evaporator to be determined.

12.1.4 The entire plant for the power supply, including the part of the electrical plant necessary for operation of electrical plant, is to be inspected externally. The Surveyor is to obtain the information required on the condition of the installation from the operating data records for the refrigerating and machinery installation and is then to decide whether individual machines will have to be opened up for inspection.

12.1.5 Insulation resistance measurements are to be carried out at the electrical plant. Any measurement protocols prepared on board may be considered.

12.1.6 All pressure vessels, including valves, fittings and safety devices, are to be inspected externally.

12.1.7 If ammonia is used as refrigerant, the covers of one or more heat exchangers are to be taken off for inspection of the tube plates. Depending on the inspection result, the Surveyor may require further parts of the installation to be opened up for inspection.

12.1.8 The refrigerant and brine pipes and their insulation are to be examined externally, and the pipes are to be tested for tightness during operation.

12.1.9 In the refrigerated cargo spaces, the air coolers, the brine grids and direct expansion evaporators respectively, as well as circulating fans, are to be inspected during operation.

12.1.10 The defrosting devices are to be externally inspected. Where necessary, proof is to be furnished of their proper functioning.

12.1.11 Bilge coverings are to be opened up. Bilges are to be checked as to their perfect condition. The drains of the upper spaces with their closing devices, the bilge pipes and their suction strums, as well as the sounding pipes, are to be inspected. Hatches, doors, pipelines, thermometer tubes with their connections and fastenings, as well as watertight doors and air ducts, are to be checked. Cemented parts where brine might seep into the bilges are to be inspected with particular care.

12.1.12 The insulation of all refrigerated cargo spaces, apparatus and piping is to be checked as to whether it is free from damages and dry, especially at positions where moisture may collect, e.g. in the bottom insulation underneath the hatches, underneath stringers and below decks.

12.1.13 The proper operation of dehydrators, thermometers and remote indicating thermometers is to be checked. The thermometers are to be correctly maintained and regularly calibrated by the Company (their accuracy is to be proven to the Surveyor as required).

12.1.14 The proper operation of air duct couplings for connecting refrigerated containers to the ship’s own refrigerated installation is to be checked. Also, it is to be ascertained whether the air ducts are free from defects.

12.1.15 The controlled atmosphere system is to be examined, as practicable, as follows:

.1 Examination of the monitoring and control systems under working condition;
.2 External examination of all compressors and pipings, including where provided carbon dioxide and ethylene scrubbers, carbon dioxide supply equipment and humidifiers;
.3 Confirmation that the plant is set to automatically achieve and maintain design O₂ and CO₂ levels in all controlled atmosphere cargo spaces;
.4 Confirmation of the satisfactory operation of all alarms and safety devices, including stopping devices, pressure and vacuum valves and gas analysers;
.5 Confirmation that warning notices are posted on all hatch covers and doors leading to spaces under controlled atmosphere;
.6 Confirmation that gas generating compartment or container complies with the requirements for hazardous area with regard to suitability of electrical equipment, ventilation, access, etc.;
.7 Confirmation that all liquid seal traps on drains from cargo spaces such as the air cooler trays are in satisfactory condition;
.8 Confirmation of satisfactory operation of positive pressure ventilation systems of all accessible spaces adjacent to spaces under controlled atmosphere including their controls;
.9 Confirmation of satisfactory operation of humidifying systems (where fitted) and their monitoring equipment in all refrigerated cargo spaces;
.10 Confirmation of availability of personal safety equipment.
12.2 RENEWAL SURVEY REQUIREMENTS

12.2.1 A general examination of the installation as detailed in 12.1 here before for the Annual survey is to be carried out.

12.2.2 The insulation of pipes or refrigerated spaces is to be part removed at random in places most likely to be subject to deterioration, especially in the vicinity of boilers and liquid fuel tanks. The condition of metal parts of hull and girders, meat rails and hooks, coils etc. is to be examined. All necessary precautions are to be taken at re-assembly so that air duct lining remains airtight.

12.2.3 Refrigerating plant safety devices are to be checked. Safety disks and pressure relief valves which appear defective are to be renewed.

12.2.4 The Surveyor is to be satisfied with the condition of compressors, condensers, condenser circulation and brine circulation pumps. The apparatuses are to be dismantled to the extent as deemed necessary by the Surveyor to enable the following:

1. For reciprocating compressors the examination of cylinders, valves, crankshafts, connecting rods, pistons, bearings and safety devices is to be carried out.
2. For rotary pumps and compressors the examination of parts subject to wear and tear are to be carried out.
3. For condensers the examination of tube plates and tubes is to be carried out.

12.2.5 The requirements here before also apply to parts of prime movers of pumps, compressors and fans which are subject to wear and tear.

12.2.6 Inspection of the sea inlet and discharge valves for cooling water supply to the installation (possibly, within the scope of classification of the ship).

12.2.7 Hydraulic pressure tests on pressure vessels are to be carried out for the first time 10 (ten) years after initial operation, and subsequently, on the occasion of each Renewal survey. In the case of pressure vessels operated with refrigerants in close circuit, the periodical hydraulic pressure tests may be dispensed with.

12.2.8 The end covers of heat exchangers are to be removed for inspection of the tube plates and tubes.

12.2.9 When installation is more than 5 (five) years old, brine coils and coolers are to be pressure tested at 1.5 times the rated working pressure.

12.2.10 For direct expansion installation, condensers and coils may be pressure tested, if deemed necessary by the Surveyor, at 1.5 times the rated working pressure.

12.2.11 The spare parts are to be checked as to their completeness and proper condition.

12.2.12 The controlled atmosphere system is to be examined as follows:

1. All gastight spaces are to be tested for tightness.
ANNEX A
Hull Surveys of Chemical Tankers
# Annex A  HULL SURVEYS OF CHEMICAL TANKERS

 Contents:

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GENERAL</td>
<td>1</td>
</tr>
<tr>
<td>1.1</td>
<td>APPLICATION</td>
<td>1</td>
</tr>
<tr>
<td>1.2</td>
<td>DEFINITIONS</td>
<td>1</td>
</tr>
<tr>
<td>1.3</td>
<td>REPAIRS</td>
<td>2</td>
</tr>
<tr>
<td>1.4</td>
<td>THICKNESS MEASUREMENTS AND CLOSE-UP SURVEYS</td>
<td>2</td>
</tr>
<tr>
<td>1.5</td>
<td>REMOTE INSPECTION TECHNIQUES (RIT)</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>RENEWAL (SPECIAL) SURVEY</td>
<td>3</td>
</tr>
<tr>
<td>2.1</td>
<td>SCHEDULE</td>
<td>3</td>
</tr>
<tr>
<td>2.2</td>
<td>SCOPE</td>
<td>3</td>
</tr>
<tr>
<td>2.3</td>
<td>EXTENT OF OVERALL AND CLOSE-UP SURVEY</td>
<td>3</td>
</tr>
<tr>
<td>2.4</td>
<td>EXTENT OF THICKNESS MEASUREMENT</td>
<td>4</td>
</tr>
<tr>
<td>2.5</td>
<td>EXTENT OF TANK TESTING</td>
<td>4</td>
</tr>
<tr>
<td>2.6</td>
<td>CHEMICAL TANKERS OVER 10 YEARS OF AGE</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>ANNUAL SURVEY</td>
<td>5</td>
</tr>
<tr>
<td>3.1</td>
<td>SCHEDULE</td>
<td>5</td>
</tr>
<tr>
<td>3.2</td>
<td>SCOPE</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>INTERMEDIATE SURVEY</td>
<td>6</td>
</tr>
<tr>
<td>4.1</td>
<td>SCHEDULE</td>
<td>6</td>
</tr>
<tr>
<td>4.2</td>
<td>SCOPE</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>PREPARATION FOR SURVEY</td>
<td>7</td>
</tr>
<tr>
<td>5.1</td>
<td>SURVEY PROGRAMME</td>
<td>7</td>
</tr>
<tr>
<td>5.2</td>
<td>CONDITIONS FOR SURVEY</td>
<td>7</td>
</tr>
<tr>
<td>5.3</td>
<td>ACCESS TO STRUCTURES</td>
<td>8</td>
</tr>
<tr>
<td>5.4</td>
<td>EQUIPMENT FOR SURVEY</td>
<td>8</td>
</tr>
<tr>
<td>5.5</td>
<td>RESCUE AND EMERGENCY RESPONSE EQUIPMENT</td>
<td>8</td>
</tr>
<tr>
<td>5.6</td>
<td>SURVEY AT SEA OR AT ANCHORAGE</td>
<td>8</td>
</tr>
<tr>
<td>5.7</td>
<td>SURVEY PLANNING MEETING</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>DOCUMENTATION ON BOARD</td>
<td>11</td>
</tr>
<tr>
<td>6.1</td>
<td>GENERAL</td>
<td>11</td>
</tr>
<tr>
<td>6.2</td>
<td>SURVEY REPORT FILE</td>
<td>11</td>
</tr>
<tr>
<td>6.3</td>
<td>SUPPORTING DOCUMENTS</td>
<td>11</td>
</tr>
<tr>
<td>6.4</td>
<td>REVIEW OF DOCUMENTATION ON BOARD</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td>PROCEDURES FOR THICKNESS MEASUREMENTS</td>
<td>12</td>
</tr>
<tr>
<td>7.1</td>
<td>GENERAL</td>
<td>12</td>
</tr>
<tr>
<td>7.2</td>
<td>CERTIFICATION OF THICKNESS MEASUREMENT FIRM</td>
<td>12</td>
</tr>
<tr>
<td>7.3</td>
<td>REPORTING</td>
<td>12</td>
</tr>
<tr>
<td>8</td>
<td>REPORTING AND EVALUATION OF SURVEY</td>
<td>13</td>
</tr>
<tr>
<td>8.1</td>
<td>EVALUATION OF SURVEY REPORT</td>
<td>13</td>
</tr>
<tr>
<td>8.2</td>
<td>REPORTING</td>
<td>13</td>
</tr>
</tbody>
</table>
1 GENERAL

1.1 APPLICATION

1.1.1 The requirements apply to all self-propelled Chemical tankers with integral tanks, i.e. vessels with Certificate of fitness for the carriage of dangerous chemicals in bulk. 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.

1.1.2 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 requirements applicable to the remainder of the ship. The requirements are not applicable for independent tanks on deck. Refer to subtitles 4.2, 5.2 and 7.2 in the Rules, Part 1 - General requirements, Ch. 5 - Surveys of ships in service.

1.1.3 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.

1.2 DEFINITIONS

1.2.1 Chemical tanker

A Chemical tanker is a ship 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.

1.2.2 Ballast tank

A Ballast tank is a tank which is used solely for the carriage of salt water ballast.

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 tested as a Ballast Tank. Cargo tanks in which water ballast might be carried only in exceptional cases per MARPOL 73/78, Annex I/13(3) are to be treated as cargo tanks.

1.2.3 Overall survey

An Overall survey is a survey intended to report on the overall condition of the hull structure and determine the extent of additional Close-up surveys.

1.2.4 Close-up survey

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 reach of hand.

1.2.5 Transverse section

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

1.2.6 Representative tank

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.

1.2.7 Suspect area

Suspect areas are locations showing substantial corrosion and/or are considered by the Surveyor to be prone to rapid wastage.

1.2.8 Critical Structural Area

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.

1.2.9 Substantial corrosion

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

1.2.10 Corrosion Prevention System

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 specification.

1.2.11 Coating condition

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 or hard scale at 10% or more, of areas under consideration.

NOTE: Reference is made to IACS Recommendation No. 87 “Guidelines for Coating Maintenance & Repairs for Ballast Tanks and Combined Cargo/Ballast Tanks on Oil Tankers”. 

2020
1.2.12. Cargo Area

Cargo Area is that part of the ship which contains cargo tanks, slop tanks and cargo/ballast pump-rooms, 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.

1.2.13 Special consideration

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.

1.2.14 Prompt and Thorough Repair

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, or recommendation.

1.2.15 Remote Inspection Techniques (RIT)

Remote Inspection Technique 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 Recommendation No. 42 – “Guidelines for Use of Remote Inspection Techniques for surveys”).

1.3 REPAIRS

1.3.1 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 weather tight integrity, is to be promptly and thoroughly (see 1.2.14) repaired.

- Areas to be considered include:
  - bottom structure and bottom plating;
  - side structure and side plating;
  - deck structure and deck plating;
  - watertight or oiltight bulkheads, and
  - hatch covers and hatch comings, where fitted (combined carriers).

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.

1.3.2 Additionally, when a survey results in the identification of structural defects or corrosion, 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.

1.3.3 Where the damage found on structure mentioned in Para. 1.3.1 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 weather tight integrity and impose a Recommendation / Condition of Class in accordance with IACS PR 35, with a specific time limit.

1.4 THICKNESS MEASUREMENTS AND CLOSE-UP SURVEYS

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

1.4.2 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.

1.5 REMOTE INSPECTION TECHNIQUES (RIT)

1.5.1 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 No. 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 Register.

1.5.2 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.

1.5.3 When using a RIT as an alternative to close-up survey, if not carried out by the Register 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 Register.

1.5.4 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 Register is to be satisfied with the methods of orientation on the structure.

1.5.5 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.

1.5.6 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.
2 RENEWAL (SPECIAL) SURVEY

2.1 SCHEDULE

2.1.1 Renewal surveys are to be carried out at 5 years intervals to renew the Certificate.

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

2.1.3 For surveys completed within 3 months before the expiry date of the Renewal survey, the next period of validity of the certificate will start from the expiry date of the Renewal survey. For surveys completed more than 3 months before the expiry date of the Renewal survey, the period of validity of the certificate 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 Renewal survey. If the owner elects to carry out the next due Renewal survey, the period of class will start from the survey completion date.

2.1.4 The Renewal survey may be commenced at the 4th Annual survey and be progressed with a view to completion by the 5th anniversary date. When the Renewal 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 Renewal survey.

2.1.5 Concurrent crediting to both Intermediate survey and Renewal survey for surveys and thickness measurements of spaces are not acceptable.

2.2 SCOPE

2.2.1 General

2.2.1.1 The Renewal 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 2.2.1.3, is in a satisfactory condition and is fit for its intended purpose for the new period of validity of the certificate of 5 years to be assigned, subject to proper maintenance and operation and to periodical surveys being carried out at the due dates.

2.2.1.2 All cargo tanks, ballast tanks including double bottom tanks, pumprooms, 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 2.4 and 2.5, to ensure that the structural integrity remains effective. The aim of the examination is to be sufficient to discover substantial corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.

2.2.1.3 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.

2.2.2 Dry dock survey

2.2.2.1 A survey in dry dock is to be a part of the Renewal 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 Renewals 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.

2.2.3 Tank Protection

2.2.3.1 Where provided, the condition of the corrosion prevention system of cargo tanks is to be examined. 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 not repaired to the satisfaction of the Surveyor.

Thickness measurements are to be carried out as deemed necessary by the Surveyor.

2.3 EXTENT OF OVERALL AND CLOSE-UP SURVEY

2.3.1 An Overall survey of all tanks and spaces is to be carried out at each Renewal survey.

2.3.2 The minimum requirements for Close-up surveys at Renewal survey are given in Table I. 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.

2.3.3 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:

   a) In particular, tanks having structural arrangements or details which have suf-
ferred defects in similar tanks or on similar ships according to available information.

b) In tanks which have structures approved with reduced scantlings due to an approved corrosion control system.

2.3.4 For areas in tanks where hard protective coatings are found to be in a GOOD condition as defined in 1.2.11, the extent of Close-up surveys according to Table I may be specially considered.

2.4 EXTENT OF THICKNESS MEASUREMENT

2.4.1 The minimum requirements for thickness measurements at Renewal survey are given in Table II. Thickness measurement of stainless steel hull structure and piping may be waived, except for clad steel plating.

2.4.2 Provisions for extended measurements for areas with substantial corrosion, are given in Table IV, and as may be additionally specified in the Survey Programme as required by 5.1. 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.

2.4.3 The Surveyor may further extend the thickness measurements as deemed necessary.

2.4.4 For areas in tanks where hard protective coating is found to be in a GOOD condition as defined in 1.2.11, the extent of thickness measurements according to Table II may be specially considered.

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

2.4.6 In cases where two or three sections are to be measured, at least one is to include a ballast tank within 0.5L amidships.

2.5 EXTENT OF TANK TESTING

2.5.1 The minimum requirements for ballast tank testing at Renewal Survey are given in 2.5.3 and Table III. The minimum requirements for cargo tank testing at Renewal Survey are given in 2.5.4 and Table III. 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 Register 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 Renewal survey win-
dow 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 are 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.

2.5.2 The Surveyor may extend the tank testing as deemed necessary.

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

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

2.5.5 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 tank top is carried out.

2.6 CHEMICAL TANKERS OVER 10 YEARS OF AGE

2.6.1 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.
3 ANNUAL SURVEY

3.1 SCHEDULE

3.1.1 Annual surveys are to be held within 3 months before or after anniversary date from the date of the initial survey of the ship for the purpose of issuing the certificate for the first time, or of the date credited for the last Renewal survey.

3.2 SCOPE

3.2.1 General

3.2.1.1 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.

3.2.2 Examination of the hull

3.2.2.1 Examination of the hull plating and its closing appliances as far as can be seen.

3.2.2.2 Examination of watertight penetrations as far as practicable.

3.2.3 Examination of weather decks

3.2.3.1 Examination of cargo tank openings including gaskets, covers, coamings and flame screens.

3.2.3.2 Examination of cargo tanks pressure/vacuum valves and flame screens.

3.2.3.3 Examination of flame screens on vents to all bunker tanks.

3.2.3.4 Examination of cargo, bunker and vent piping systems, including vent masts and headers.

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

3.2.4.1 Examination of all pumproom bulkheads for signs of chemical leakage or fractures and, in particular, the sealing arrangements of all penetrations of pumproom bulkheads.

3.2.4.2 Examination of the condition of all piping systems.

3.2.5 Examination of ballast tanks

3.2.5.1 Examination of Ballast Tanks where required as a consequence of the results of the Renewal Survey (see 2.2.3) and Intermediate Survey (see 4.2.2.1 and 4.2.2.2) 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 IV. 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 INTERMEDIATE SURVEY

4.1 SCHEDULE

4.1.1 The Intermediate survey is to be held at or between either the 2nd or 3rd Annual survey.

4.1.2 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.

4.1.3 Concurrent crediting to both Intermediate survey and Renewal survey for surveys and thickness measurements of spaces are not acceptable.

4.2 SCOPE

4.2.1 General

4.2.1.1 The survey extent is dependent on the age of the vessel as specified in 4.2.2 to 4.2.4.

4.2.1.2 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.

4.2.2 Chemical tankers between 5 and 10 years of age, the following is to apply:

4.2.2.1 For ballast tanks, 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.

4.2.2.2 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 and the hard protective coating is not repaired to the satisfaction of the Surveyor.

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

4.2.3 Chemical tankers between 10 and 15 years of age, the following is to apply:

4.2.3.1 The requirements of the Intermediate Survey are to be to the same extent as the previous Renewal Survey as required in 2 and 5.1. However, pressure testing of cargo and ballast tanks is not required unless deemed necessary by the attending Surveyor.

4.2.3.2 In application of 4.2.3.1, 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 2.1.4.

4.2.3.3 In application of 4.2.3.1, an underwater survey may be considered in lieu of the requirements of 2.2.2.

4.2.4 Chemical Tankers over 15 years of age, the following is to apply:

4.2.4.1 The requirements of the Intermediate Survey are to be to the same extent as the previous Renewal Survey as required in 2 and 5.1. However, testing of cargo and ballast tanks is not required unless deemed necessary by the attending Surveyor.

4.2.4.2 In application of 4.2.4.1, 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 2.1.4.

4.2.4.3 In application of 4.2.4.1, a survey in dry dock is to be part of the intermediate survey. The overall and close-up survey 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.
5 PREPARATION FOR SURVEY

5.1 SURVEY PROGRAMME

5.1.1 The Owner in co-operation with the Register is to work out a specific Survey Programme prior to the commencement of any part of:
- the Renewal Survey,
- the Intermediate Survey for oil tankers over 10 years of age.

The Survey Programme at Intermediate Survey may consist of the Survey Programme at the previous Renewal Survey supplemented by the Executive Hull Summary of that Renewal Survey and later relevant survey reports.

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

The Survey Programme is to be in a written format.

5.1.1.1 Prior to the development of the survey programme, the survey planning questionnaire is to be completed by owner, and forwarded to the Register.

5.1.2 In developing the Survey Programme, the following documentation is to be collected and consulted with a view to selecting tanks, areas, and structural elements to be examined:
- survey status and basic ship information;
- documentation on-board, as described in 6.2 and 6.3;
- 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 Register and the owner,
- information regarding the use of the ship’s tanks, typical cargoes and other relevant data,
- 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); and,
- any other information that will help identify suspect areas and critical structural areas.

5.1.3 The submitted Survey Programme is to account for and comply, as a minimum, with the requirements of Tables I, II 2.5 and 2.6 for Close-up survey, thickness measurement tank testing, and pipe testing, respectively, and is to include relevant information including at least:
- 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 tanks;
- list of tanks with information on use, 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;
- nomination of tanks and areas for close-up survey (per 2.3);
- nomination of sections for thickness measurement (per 2.4);
- nomination of tanks for tank testing (per 2.5), and the pipes that are to undergo pipe testing (per 2.6);
- identification of the thickness measurement company;
- damage experience related to the ship in question;
- critical structural areas and suspect areas, where relevant.

5.1.4 The Register will advise the Owner of the maximum acceptable structural corrosion diminution levels applicable to the vessel.

5.2 CONDITIONS FOR SURVEY

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

5.2.1.1 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 Register and are to be in accordance with IACS PR 37.

5.2.1.2 Details of the means of access are to be provided in the survey planning questionnaire.
5.2.1.3 In cases where the provisions of safety and required access are judged by the attending surveyors not to be adequate, the survey of the spaces involved is to not proceed.

5.2.2 Tanks and spaces are to be safe for access. Tanks and spaces are to be gas free 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.

5.2.3 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.

5.2.4 Significant illumination is to be provided to reveal significant corrosion, deformation, fractures, damages or other structural deterioration.

5.2.5 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.

5.3 ACCESS TO STRUCTURES

5.3.1 For overall survey, means are to be provided to enable the Surveyor to examine the hull structure in a safe and practical way.

5.3.2 For close-up survey, 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,
- hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms,
- boats or rafts,
- portable ladders,
- other equivalent means.

5.3.3 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 Register.

5.4 EQUIPMENT FOR SURVEY

5.4.1 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.

5.4.2 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.

5.4.3 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.

5.4.4 Adequate and safe lighting is to be provided for the safe and efficient conduct of the survey.

5.4.5 Adequate protective clothing is to be made available and used during the survey (e.g. safety helmet, gloves, safety shoes, etc.).

5.5 RESCUE AND EMERGENCY RESPONSE EQUIPMENT

5.5.1 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.

5.6 SURVEY AT SEA OR AT ANCHORAGE

5.6.1 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 5.1, 5.2, 5.3 and 5.4.

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

5.6.3 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 0.25 m.

5.6.4 When rafts or boats are used for close-up surveys, 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, should be used;
2. the boat or raft should be tethered to the access ladder and an additional person
should be stationed down the access ladder with a clear view of the boat or raft;
3. appropriate lifejackets should be available for all participants;
4. the surface of water in the tank should be calm (under all foreseeable conditions the expected rise of water within the tank should not exceed 0.25 m) and the water level stationary. On no account should 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 cargo on the water is not acceptable;
6. at no time should the water level 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 should only be contemplated if a deck access manhole is fitted and open in the bay being examined, so that an escape route for the survey partly 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 should be used should be isolated to prevent a transfer of gas from other tanks (or spaces).

5.6.5 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.

5.6.6 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 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:
i. access direct from the deck via a vertical ladder and a small platform fitted approximately 2 m below the deck in each bay; or
ii. 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 5.6.6-1).

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.

Figure 5.6.6-1

5.7 SURVEY PLANNING MEETING

5.7.1 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.

5.7.2 Prior to the commencement of any part of the Renewal 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, 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 programme are in place, so as to ensure the safe and efficient conduct of the survey work to be carried out. See also 7.1.2.

5.7.3 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/descaling, 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; and
.9 communication between attending surveyor(s) the thickness measurement company operator(s) and owner representative(s) concerning findings.
6 DOCUMENTATION ON BOARD

6.1 GENERAL

6.1.1 The Owner is to obtain, supply and maintain on board documentation as specified in 6.2 and 6.3, which is to be readily available for the Surveyor.

6.1.2 The documentation is to be kept on board for the life time of the ship.

6.2 SURVEY REPORT FILE

6.2.1 A Survey Report File is to be a part of the documentation on board consisting of:
- Reports of structural surveys,
- Executive Hull Summary,
- Thickness measurement reports.

6.2.2 The Survey Report File is to be available in the Owner's and the Register's management offices.

6.3 SUPPORTING DOCUMENTS

6.3.1 The following additional documentation is to be available onboard:
- Survey Programme as required by 5.1 until such time as the Renewal Survey or Intermediate Survey, as applicable, has been completed,
- main structural plans of cargo and ballast tanks,
- previous repair history,
- cargo and ballast history,
- extent of use of inert gas plant and tank cleaning procedures,
- inspections by ship's personnel with reference to:
  - structural deterioration in general,
  - leakage in bulkheads and piping,
  - condition of corrosion prevention system, if any,
- any other information that will help identify Critical Structural Areas and/or Suspect Areas requiring inspection.

6.4 REVIEW OF DOCUMENTATION ON BOARD

6.4.1 Prior to survey, the Surveyor is to examine the completeness of the documentation onboard, and its contents as a basis for the survey.
7 PROCEDURES FOR THICKNESS MEASUREMENTS

7.1 GENERAL

7.1.1 The required thickness measurements, if not carried out by the Register itself, are to be witnessed by a Surveyor of the Register. The Surveyor is to be on board to the extent necessary to control the process.

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

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

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

7.2 CERTIFICATION OF THICKNESS MEASUREMENT FIRM

7.2.1 The thickness measurements are to be carried out by a qualified firm certified by the Register according to principles stated in the Rules, Part I - General requirements, Ch. 4 - Approval of manufacturers and service suppliers.

7.3 REPORTING

7.3.1 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.

7.3.2 The Surveyor is to review the final thickness measurement report and countersign the cover page.
8 REPORTING AND EVALUATION OF SURVEY

8.1 EVALUATION OF SURVEY REPORT

8.1.1 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.

8.2 REPORTING

8.2.1 Principles for survey reporting are shown in the Annex II of IACS UR Z10.1.

8.2.2 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.

8.2.3 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 the Register's Head office.

Table I.1
MINIMUM REQUIREMENTS FOR CLOSE-UP SURVEYS AT RENEWAL SURVEY OF SINGLE SKIN CHEMICAL TANKERS

<table>
<thead>
<tr>
<th>I Renewal survey (age ≤ 5 years)</th>
<th>II Renewal survey (5 years &lt; age ≤ 10 years)</th>
<th>III Renewal survey (10 years &lt; age ≤ 15 years)</th>
<th>IV Renewal and all subsequent surveys (age &gt; 15 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A One web frame in a ballast wing tank</td>
<td>E All web frame – in a ballast wing tank or double bottom ballast tank (see Note 1)</td>
<td>E All web frame rings – in all ballast tanks</td>
<td>As for III Renewal survey Additional transverse areas as deemed necessary by the Register</td>
</tr>
<tr>
<td>B One deck transverse in a cargo tank or on deck</td>
<td>B One deck transverse – in each remaining ballast tank or on deck</td>
<td>A All web frame rings – in cargo wing tank</td>
<td></td>
</tr>
<tr>
<td>D One transverse bulkhead - lower part in a ballast tank</td>
<td>B One deck transverse – in a cargo wing tank or on deck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D One transverse bulkhead - lower part in a cargo wing tank</td>
<td>B One deck transverse – in two cargo centre tanks or on deck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D One transverse bulkhead - lower part in a cargo centre tank (see Note 2)</td>
<td>C Both transverse bulkheads – in a ballast wing tank</td>
<td>C All transverse bulkheads – in all cargo tanks</td>
<td></td>
</tr>
<tr>
<td>D One transverse bulkhead lower part in each remaining ballast tank</td>
<td>D One transverse bulkhead – lower part in two cargo centre tanks (see Note 2)</td>
<td>C All transverse bulkheads – in all ballast tanks</td>
<td></td>
</tr>
<tr>
<td>D One transverse bulkhead lower part in a cargo wing tank</td>
<td>D One transverse bulkhead – lower part in two cargo centre tanks (see Note 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOTE 1: Ballast double hull tank – means double bottom tank plus double side tank plus double deck tank, as applicable, even though these tanks are separate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-D: are areas to be subjected to close-up surveys and thickness measurements (see Annex D)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A) Complete transverse web frame ring including adjacent structural members.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B) Deck transverse including adjacent deck structural members.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C) Transverse bulkhead complete - including girder system and adjacent members.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D) Transverse bulkhead lower part - including girder system and adjacent structural members.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table I.2
MINIMUM REQUIREMENTS FOR CLOSE-UP SURVEYS AT RENEWAL SURVEY OF DOUBLE SKIN CHEMICAL TANKERS

<table>
<thead>
<tr>
<th>I Renewal survey (age ≤ 5 years)</th>
<th>II Renewal survey (5 years &lt; age ≤ 10 years)</th>
<th>III Renewal survey (10 years &lt; age ≤ 15 years)</th>
<th>IV Renewal and all subsequent surveys (age &gt; 15 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 One web frame ring in a ballast double hull tank (see Note I)</td>
<td>1 All web frame rings – in a ballast wing tank or ballast double hull tank (see Note I)</td>
<td>1 All web frame rings – in all ballast tanks</td>
<td>As for III Renewal survey</td>
</tr>
<tr>
<td>2 One deck transverse in a cargo tank or on deck</td>
<td>6 The knuckle area and the upper part (3 metres approx.) of one web frame in each remaining ballast tank</td>
<td>7 All web frame rings – in cargo wing tank</td>
<td>Additional transverse areas as deemed necessary by the Register</td>
</tr>
<tr>
<td>4 One transverse bulkhead – in a ballast tank (see Note I)</td>
<td>2 One deck transverse – in two cargo tanks</td>
<td>7 One web frame ring – in each remaining cargo tank</td>
<td></td>
</tr>
<tr>
<td>5 One transverse bulkhead in a cargo wing tank</td>
<td>4 One transverse bulkhead – in each ballast tank (see Note I)</td>
<td>3 All transverse bulkheads – in all cargo tanks</td>
<td></td>
</tr>
<tr>
<td>5 One transverse bulkhead in a cargo centre tank (see Note II)</td>
<td>5 One transverse bulkhead – in two cargo centre tanks (see Note II)</td>
<td>4 All transverse bulkheads – in all ballast tanks</td>
<td></td>
</tr>
<tr>
<td>5 One transverse bulkhead – in a cargo wing tank</td>
<td>5 One transverse bulkhead – in a cargo wing tank</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1), (2), (3), (4), (5), (6) and (7) are areas to be subjected to close-up surveys and thickness measurements (see Annex D).

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 metres approximately), including adjacent structural members. Knuckle area is the area of the web frame around the connections of the slope hopper platting 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 oil tank means deck transverse, longitudinal bulkhead vertical girder 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 case of centre longitudinal bulkhead), transverse bulkheads in wing tanks are to be surveyed.
### Table II
MINIMUM REQUIREMENTS FOR THICKNESS MEASUREMENT AT RENEWAL SURVEY OF CHEMICAL TANKERS FOR WHICH ESP REQUIREMENTS APPLY

<table>
<thead>
<tr>
<th></th>
<th>I Renewal survey (age ≤ 5 years)</th>
<th>II Renewal survey (5 years &lt; age ≤ 10 years)</th>
<th>III Renewal survey (10 years &lt; age ≤ 15 years)</th>
<th>IV Renewal and all subsequent surveys (age &gt; 15 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>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).</td>
<td>2. Within cargo area: - Each deck plate, - one transverse section.</td>
<td>2. Within cargo area: - Each deck plate, - two transverse sections (1), - all wind and water strakes.</td>
<td>2. Within cargo area: - Each deck plate, - three transverse sections (1), - each bottom plate.</td>
<td></td>
</tr>
<tr>
<td>4. Measurements for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.1 or I.2, as applicable.</td>
<td>4. Measurements for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.1 or I.2, as applicable.</td>
<td>4. Measurements for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.1 or I.2, as applicable.</td>
<td>4. Measurements for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.1 or I.2, as applicable.</td>
<td></td>
</tr>
</tbody>
</table>

(1): At least one section is to include a ballast tank within 0.5 L amidships.

### Table III
MINIMUM REQUIREMENTS FOR TANK TESTING AT RENEWAL SURVEY OF CHEMICAL TANKERS FOR WHICH ESP REQUIREMENTS APPLY

<table>
<thead>
<tr>
<th></th>
<th>I Renewal survey (age ≤ 5 years)</th>
<th>II Renewal and all subsequent surveys (age &gt; 5 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. All ballast tank boundaries.</td>
<td>1. All ballast tank boundaries.</td>
<td></td>
</tr>
<tr>
<td>2. Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, pumprooms or cofferdams.</td>
<td>2. All cargo tank boundaries.</td>
<td></td>
</tr>
</tbody>
</table>
### Table IV, Sheet 1

**BOTTOM, INNER BOTTOM AND HOPPER STRUCTURE**

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom, inner bottom and hopper structure plating</td>
<td>Minimum of three bays across tank, including aft bay Measurements around and under all suction bell mouths</td>
<td>5 point pattern for each panel between longitudinals and floors</td>
</tr>
<tr>
<td>Bottom, inner bottom and hopper structure longitudinals</td>
<td>Minimum of three longitudinals in each bay where bottom plating measured</td>
<td>Three measurements in line across flange and three measurements on vertically web</td>
</tr>
<tr>
<td>Bottom girders, including the watertight ones</td>
<td>At fore and aft watertight floors and in centre of tanks</td>
<td>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</td>
</tr>
<tr>
<td>Bottom floors, including the watertight ones</td>
<td>Three floors in bays where bottom plating measured, with measurements at both ends and middle</td>
<td>5 point pattern over two square metre area</td>
</tr>
<tr>
<td>Hopper structure web frame ring</td>
<td>Three floors in bays where bottom plating measured</td>
<td>5 point pattern over one square metre of platting. Single measurements on flange</td>
</tr>
<tr>
<td>Hopper structure transverse watertight bulkhead or swash bulkhead</td>
<td>- lower 1/3 of bulkhead</td>
<td>5 point pattern over one square metre of platting</td>
</tr>
<tr>
<td></td>
<td>- upper 2/3 of bulkhead</td>
<td>5 point pattern over two square metre of platting</td>
</tr>
<tr>
<td></td>
<td>- stiffeners</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>- (minimum of three)</td>
<td></td>
</tr>
<tr>
<td>Panel stiffening</td>
<td>Where applicable</td>
<td>Single measurements</td>
</tr>
</tbody>
</table>

### Table IV, Sheet 2

**DECK STRUCTURE**

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck plating</td>
<td>Two transverse bands across tank</td>
<td>Minimum of three measurements per plate per band</td>
</tr>
<tr>
<td>Deck longitudinals</td>
<td>Every third longitudinal in each of two bands with a minimum of one longitudinal</td>
<td>Three measurements in line vertically on webs, and two measurements on flange (if fitted)</td>
</tr>
<tr>
<td>Deck girders and brackets</td>
<td>At fore and aft transverse bulkhead, bracket toes and in centre of tanks</td>
<td>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</td>
</tr>
<tr>
<td>Deck transverse webs</td>
<td>Minimum of two webs with measurements at middle and both ends of span</td>
<td>5 points pattern over one square metre area. Single measurements on flange</td>
</tr>
<tr>
<td>Vertical web and transverse bulkhead in wing ballast tank for double hull design (two metres from deck)</td>
<td>Minimum of two webs, and both transverse bulkheads</td>
<td>5 point pattern over one square metre area</td>
</tr>
<tr>
<td>Panel stiffening</td>
<td>Where provided</td>
<td>Single measurements</td>
</tr>
</tbody>
</table>
### REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION

**RENEWAL SURVEY OF CHEMICAL TANKERS FOR WHICH ESP REQUIREMENTS APPLY WITHIN THE CARGO AREA LENGTH**

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SIDE SHELL AND LONGITUDINAL BULKHEADS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side shell and longitudinal bulkhead plating:</td>
<td>- Plating between each pair of longitudinals in a minimum of three bays (along the tank)</td>
<td>Single measurement</td>
</tr>
<tr>
<td>- Deckhead and bottom strakes, and strakes in way of horizontal girders</td>
<td>- Plating between every third pair of longitudinals in same three bays</td>
<td></td>
</tr>
<tr>
<td>- All other strakes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Side shell and longitudinal bulkhead longitudinals on:</td>
<td>- Each longitudinal in same three bays</td>
<td>3 measurements across web and 1 measurement on flange</td>
</tr>
<tr>
<td>- Deckhead and bottom strakes</td>
<td>- Every third longitudinal in same three bays</td>
<td></td>
</tr>
<tr>
<td>- All other strakes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longitudinals - bracket</td>
<td>- Minimum of three at top, middle and bottom of tank in same three bays</td>
<td>5 point pattern over area of bracket</td>
</tr>
<tr>
<td>Vertical web and transverse bulkheads of double side tanks (excluding deck area):</td>
<td>- Minimum of two webs and both transverse bulkheads</td>
<td>- 5 point pattern over approx. two square metre area</td>
</tr>
<tr>
<td>- Strakes in way of horizontal girders</td>
<td>- Minimum of two webs and both transverse bulkheads</td>
<td>- Two measurements between each pair of vertical stiffeners</td>
</tr>
<tr>
<td>- Other strakes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Web frames and cross ties for other tanks than double side tanks</td>
<td>Three webs with minimum of three locations on each web, including in way of cross tie connections and lower end bracket</td>
<td>5 point pattern over approximately two square metre area of webs, plus single measurements on flanges of web frame and cross ties</td>
</tr>
<tr>
<td>Horizontal girders</td>
<td>Plating on each girder in a minimum of three bays</td>
<td>Two measurements between each pair of longitudinal girder stiffeners</td>
</tr>
<tr>
<td>Panel stiffening</td>
<td>Where applicable</td>
<td>Single measurements</td>
</tr>
</tbody>
</table>
Table IV, Sheet 4

REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION
RENEWAL SURVEY OF CHEMICAL TANKERS FOR WHICH ESP REQUIREMENTS APPLY WITHIN THE CARGO AREA LENGTH

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper and lower stool, where fitted</td>
<td>Transverse band within 25 mm of welded connection to inner bottom/deck plating</td>
<td>5 points pattern between stiffeners over one meter length</td>
</tr>
<tr>
<td></td>
<td>Transverse band within 25 mm of welded connection to shelf plate</td>
<td></td>
</tr>
<tr>
<td>Deckhead and bottom strakes, and strakes in way of stringer platforms</td>
<td>Plating between pair of stiffeners at three locations: approximately 1/4, 1/2 and 3/4 width of tank</td>
<td>5 points pattern between stiffeners over one meter length</td>
</tr>
<tr>
<td>All other strakes</td>
<td>Plating between pair of stiffeners at middle location</td>
<td>Single measurement</td>
</tr>
<tr>
<td>Stiffeners</td>
<td>Plating for each change of scantling at centre of panel and at flange or fabricated connection</td>
<td>5 point pattern over about 1 square metre of plating</td>
</tr>
<tr>
<td>Brackets</td>
<td>Minimum of three at top middle and bottom of tank</td>
<td>5 point pattern over areas of bracket</td>
</tr>
<tr>
<td>Horizontal stringers</td>
<td>All stringers with measurements at both ends and middle</td>
<td>5 point pattern over one square metre area, plus single measurements near bracket toes and on flanges</td>
</tr>
<tr>
<td>Deep webs and girders</td>
<td>Measurements at toe of bracket and at centre of span</td>
<td>For web, 5 point pattern over about 1 square metre, 3 measurements across face flat</td>
</tr>
</tbody>
</table>
ANNEX B
Hull Surveys of Double Hull Oil Tankers
Annex B  HULL SURVEYS OF DOUBLE HULL OIL TANKERS

Contents:

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  GENERAL</td>
<td>1</td>
</tr>
<tr>
<td>1.1 APPLICATION</td>
<td>1</td>
</tr>
<tr>
<td>1.2 DEFINITIONS</td>
<td>1</td>
</tr>
<tr>
<td>1.3 REPAIRS</td>
<td>4</td>
</tr>
<tr>
<td>1.4 THICKNESS MEASUREMENTS AND CLOSE-UP SURVEYS</td>
<td>4</td>
</tr>
<tr>
<td>2  RENEWAL (SPECIAL) SURVEY</td>
<td>5</td>
</tr>
<tr>
<td>2.1 SCHEDULE</td>
<td>5</td>
</tr>
<tr>
<td>2.2 SCOPE</td>
<td>5</td>
</tr>
<tr>
<td>2.3 EXTENT OF OVERALL AND CLOSE-UP SURVEYS</td>
<td>5</td>
</tr>
<tr>
<td>2.4 EXTENT OF THICKNESS MEASUREMENTS</td>
<td>6</td>
</tr>
<tr>
<td>2.5 EXTENT OF TANK TESTING</td>
<td>6</td>
</tr>
<tr>
<td>3  ANNUAL SURVEY</td>
<td>7</td>
</tr>
<tr>
<td>3.1 SCHEDULE</td>
<td>7</td>
</tr>
<tr>
<td>3.2 SCOPE</td>
<td>7</td>
</tr>
<tr>
<td>4  INTERMEDIATE SURVEY</td>
<td>8</td>
</tr>
<tr>
<td>4.1 SCHEDULE</td>
<td>8</td>
</tr>
<tr>
<td>4.2 SCOPE</td>
<td>8</td>
</tr>
<tr>
<td>5  PREPARATION FOR SURVEY</td>
<td>9</td>
</tr>
<tr>
<td>5.1 SURVEY PROGRAMME</td>
<td>9</td>
</tr>
<tr>
<td>5.2 CONDITIONS FOR SURVEY</td>
<td>9</td>
</tr>
<tr>
<td>5.3 ACCESS TO STRUCTURES</td>
<td>10</td>
</tr>
<tr>
<td>5.4 EQUIPMENT FOR SURVEY</td>
<td>10</td>
</tr>
<tr>
<td>5.5 RESCUE AND EMERGENCY RESPONSE EQUIPMENT</td>
<td>10</td>
</tr>
<tr>
<td>5.6 SURVEY AT SEA OR AT ANCHORAGE</td>
<td>10</td>
</tr>
<tr>
<td>5.7 SURVEY PLANNING MEETING</td>
<td>11</td>
</tr>
<tr>
<td>6  DOCUMENTATION ON BOARD</td>
<td>13</td>
</tr>
<tr>
<td>6.1 GENERAL</td>
<td>13</td>
</tr>
<tr>
<td>6.2 SURVEY REPORT FILE</td>
<td>13</td>
</tr>
<tr>
<td>6.3 SUPPORTING DOCUMENTS</td>
<td>13</td>
</tr>
<tr>
<td>6.4 REVIEW OF DOCUMENTATION ON BOARD</td>
<td>13</td>
</tr>
<tr>
<td>7  PROCEDURES FOR THICKNESS MEASUREMENTS</td>
<td>14</td>
</tr>
<tr>
<td>7.1 GENERAL</td>
<td>14</td>
</tr>
<tr>
<td>7.2 CERTIFICATION OF THICKNESS MEASUREMENTS FIRM</td>
<td>14</td>
</tr>
<tr>
<td>7.3 NUMBER AND LOCATIONS OF MEASUREMENTS</td>
<td>14</td>
</tr>
<tr>
<td>7.4 REPORTING</td>
<td>17</td>
</tr>
<tr>
<td>8  ACCEPTANCE CRITERIA</td>
<td>18</td>
</tr>
<tr>
<td>8.1 GENERAL</td>
<td>18</td>
</tr>
<tr>
<td>8.2 ACCEPTANCE CRITERIA FOR PITTING CORROSION OF CSR SHIPS</td>
<td>18</td>
</tr>
<tr>
<td>8.3 ACCEPTANCE CRITERIA FOR EDGE CORROSION OF CSR SHIPS</td>
<td>18</td>
</tr>
<tr>
<td>8.4 ACCEPTANCE CRITERIA FOR GROOVING CORROSION OF CSR SHIPS</td>
<td>18</td>
</tr>
<tr>
<td>9  REPORTING AND EVALUATION OF SURVEY</td>
<td>19</td>
</tr>
<tr>
<td>9.1 EVALUATION OF SURVEY REPORT</td>
<td>19</td>
</tr>
<tr>
<td>9.2 REPORTING</td>
<td>19</td>
</tr>
</tbody>
</table>
RULES FOR THE CLASSIFICATION OF SHIPS
PART 1 - CHAPTER 5 - Annex B

1 GENERAL

1.1 APPLICATION

1.1.1 The requirements apply to all self-propelled Double Hull Oil Tankers.

1.1.2 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 requirements applicable to the remainder of the ship. Refer to subtitles 4.2, 5.2 and 7.2 in the Rules, Part I - General requirements, Ch. 5 - Surveys of ships in service.

1.1.3 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.

1.2 DEFINITIONS

1.2.1 Double Hull Oil Tanker
A Double Hull Oil Tanker is a ship which is constructed primarily for the carriage of oil 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.

1.2.2 Ballast Tank
A Ballast Tank is a tank which is used solely for the carriage of salt water ballast.

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 73/78 Annex I/18(3) are to be treated as cargo tanks.

1.2.3 Overall Survey
An Overall Survey is a survey intended to report on the overall condition of the hull structure and determine the extent of additional Close-up Surveys.

1.2.4 Close-up Survey
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 reach of hand.

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

1.2.6 Representative Tank
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.

1.2.7 Suspect Area
Suspect Areas are locations showing Substantial Corrosion and/or are considered by the Surveyor to be prone to rapid wastage.

1.2.8 Critical Structural Area
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.

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

1.2.10 Substantial Corrosion
Substantial Corrosion is an extent of corrosion such that assessment of corrosion pattern indicate 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 \(t_{net} + 0.5\)mm and \(t_{net}\).

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

Hard Protective Coating is to usually 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 specification.

1.2.12 Coating condition
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 or hard scale at 10% or more, of areas under consideration.

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11 MARPOL 73/78 Annex I cargoes - requirements in this UR are also applicable to existing double hull tankers not complying with MARPOL 73/78 Regulation 13F, but having a U-shaped midship section.
NOTE: Reference is made to IACS Recommendation No.87 “Guidelines for Coating Maintenance & Repairs for Ballast Tanks and Combined Tanks on Oil Tankers”.

1.2.13 Cargo Area
Cargo Area is that part of the ship which contains cargo tanks, slop tanks and cargo/ballast pumprooms, 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.

1.2.14 Special consideration
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.

1.2.15 Prompt and Thorough Repair
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 classification, or recommendation.

1.2.16 Pitting Corrosion
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 1.

1.2.17 Edge Corrosion
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 2.

1.2.18 Grooving Corrosion
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.

Figure 1 - Pitting intensity diagrams
Figure 2 - Edge corrosion

Figure 3 - Grooving corrosion
1.3 REPAIRS

1.3.1 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 1.2.14) repaired.

Areas to be considered include:
- bottom structure and bottom plating;
- side structure and side plating;
- deck structure and deck plating;
- watertight or oiltight bulkheads;
- hatch covers or hatch coamings, where fitted (combination carriers).

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.

1.3.2 Additionally, when a survey results in the identification of structural defects or corrosion, 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.

1.3.3 Where the damage found on structure mentioned in para. 1.3.1 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 weather tight integrity and impose a Recommendation / Condition of Class in accordance with IACS PR 35, with a specific time limit.

1.4 THICKNESS MEASUREMENTS AND CLOSE-UP SURVEYS

1.4.1 In any kind of survey, i.e. renewal, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by Table II, of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.
2 RENEWAL (SPECIAL) SURVEY

2.1 SCHEDULE

2.1.1 Renewal Surveys are to be carried out at 5 years intervals to renew the Certificate of Class.

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

2.1.3 For surveys completed within 3 months before the expiry date of the Renewal Survey, the next period of validity of the Cargo Ship Safety Construction Certificate will start from the expiry date of the Renewal Survey. For surveys completed more than 3 months before the expiry date of the Renewal Survey, the period of validity of the Cargo Ship Safety Construction Certificate 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 Renewal survey. If the owner elects to carry out the next due Renewal survey, the period of class will start from the survey completion date.

2.1.4 The Renewal Survey may be commenced at the 4th Annual Survey and be progressed with a view to completion by the 5th anniversary date. When the Renewal 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 Renewal survey.

2.1.5 Concurrent crediting to both Intermediate survey and Renewal survey for surveys and thickness measurements of spaces are not acceptable.

2.2 SCOPE

2.2.1 General

2.2.1.1 The Renewal 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 2.2.1.3, is in a satisfactory condition and is fit for its intended purpose for the new period of validity of the Cargo Ship Safety Construction Certificate of 5 years to be assigned, subject to proper maintenance and operation and to periodical surveys being carried out at the due dates.

2.2.1.2 All cargo tanks, ballast tanks including double bottom tanks, pumprooms, 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 2.4 and 2.5, to ensure that the structural integrity remains effective. The aim of the examination is to be sufficient to discover substantial corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.

2.2.1.3 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.

2.2.2 Dry Dock Survey

2.2.2.1 A survey in dry dock is to be a part of the Renewal 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 Renewals 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.

2.2.3 Tank Protection

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

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 and the hard protective coating is not repaired to the satisfaction of the Surveyor.

Thickness measurements are to be carried out as deemed necessary by the Surveyor.

2.3 EXTENT OF OVERALL AND CLOSE-UP SURVEYS

2.3.1 An Overall Survey of all tanks and spaces is to be carried out at each Renewal Survey.

2.3.2 The minimum requirements for Close-up Surveys at Renewal Survey are given in Table I.

2.3.3 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:

a) in particular, tanks having structural ar-
rangements or details which have suffered defects in similar tanks or on similar ships according to available information;

b) in tanks which have structures approved with reduced scantlings due to an approved corrosion control system.

2.3.4 For areas in tanks where hard protective coatings are found to be in a GOOD condition as defined in 1.2.11, the extent of Close-up Surveys according to Table I may be specially considered.

2.4 EXTENT OF THICKNESS MEASUREMENTS

2.4.1 The minimum requirements for thickness measurements at Renewal Survey are given in Table II.

2.4.2 Provisions for extended measurements for areas with Substantial Corrosion, are given in Table IV, and as may be additionally specified in the Survey Programme as required. in 5.1. 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.

2.4.3 The Surveyor may further extend the thickness measurements as deemed necessary.

2.4.4 For areas in tanks where hard protective coating is found to be in a GOOD condition as defined in 1.2.11, the extent of thickness measurements according to Table II may be specially considered.

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

2.4.6 In cases where two or three sections are to be measured, at least one is to include a Ballast Tank within 0.5L amidships.

NOTE: In case of Oil Tankers of 130 m in length and upwards (as defined in the International Convention on Load Lines in force), and more than 10 years of age, the sampling method of thickness measurements is to be used for longitudinal strength evaluation as required in 9.1.1.1.

2.5 EXTENT OF TANK TESTING

2.5.1 The minimum requirements for ballast tank testing at Renewal Survey are given in 2.5.3 and Table III. The minimum requirements for cargo tank testing at Renewal Survey are given in 2.5.4 and Table III. 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 Register 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 Renewal 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 are 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.

2.5.2 The Surveyor may extend the tank testing as deemed necessary.

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

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

2.5.5 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.
3 ANNUAL SURVEY

3.1 SCHEDULE

3.1.1 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 Renewal Survey.

3.2 SCOPE

3.2.1 General

3.2.1.1 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.

3.2.2 Examination of the hull

3.2.2.1 Examination of the hull plating and its closing appliances as far as can be seen.

3.2.2.2 Examination of watertight penetrations as far as practicable.

3.2.3 Examination of the weather deck

3.2.3.1 Examination of cargo tank openings including gaskets, covers, coamings and flame screens.

3.2.3.2 Examination of cargo tanks pressure/vacuum valves and flame screens.

3.2.3.3 Examination of flame screens on vents to all bunker tanks.

3.2.3.4 Examination of cargo, crude oil washing, bunker and vent piping systems, including vent masts and headers.

3.2.4 Examination of cargo pump rooms and pipe tunnels if fitted

3.2.4.1 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.

3.2.4.2 Examination of the condition of all piping systems.

3.2.5 Examination of Ballast Tanks

3.2.5.1 Examination of Ballast Tanks where required as a consequence of the results of the Renewal Survey (see 2.2.3) and Intermediate Survey (see 4.2.2.1 and 4.2.2.2) 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 IV. 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 corrosion areas are to be carried out at annual and intermediate surveys.
4 INTERMEDIATE SURVEY

4.1 SCHEDULE

4.1.1 The Intermediate Survey is to be held at or between either the 2nd or 3rd Annual Survey.

4.1.2 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.

4.1.3 Concurrent crediting to both Intermediate survey and Renewal survey for surveys and thickness measurements of spaces are not acceptable.

4.2 SCOPE

4.2.1 General

4.2.1.1 The survey extent is dependent on the age of the vessel as specified in 4.2.2 to 4.2.4 and shown in Table V.

4.2.1.2 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.

4.2.1.3 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.

4.2.2 Double Hull Oil Tankers between 5 and 10 years of age

The following is to apply:

4.2.2.1 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.

4.2.2.2 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 and the hard protective coating is not repaired to the satisfaction of the Surveyor.

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

4.2.3 Double Hull Oil Tankers between 10 and 15 years of age

The following is to apply:

4.2.3.1 The requirements of the Intermediate Survey are to be to the same extent as the previous Renewal Survey as required in 2 and 5.1. However, pressure testing of cargo and ballast tanks and the requirements for longitudinal strength evaluation of Hull Girder as required in 8.1.1.1 are not required unless deemed necessary by the attending Surveyor.

4.2.3.2 In application of 4.2.3.1, 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 2.1.4.

4.2.3.3 In application of 4.2.3.1, an underwater survey may be considered in lieu of the requirements of 2.2.2.

4.2.4 Double Hull Oil Tankers over 15 years of age

The following is to apply:

4.2.4.1 The requirements of the Intermediate Survey are to be to the same extent as the previous Renewal Survey as required in 2 and 5.1. However, pressure testing of cargo and ballast tanks and the requirements for longitudinal strength evaluation of Hull Girder as required in 8.1.1.1 are not required unless deemed necessary by the attending Surveyor.

4.2.4.2 In application of 4.2.4.1, 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 2.1.4.

4.2.4.3 In application of 4.2.4.1, 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.
5 PREPARATION FOR SURVEY

5.1 SURVEY PROGRAMME

5.1.1 The Owner in co-operation with the Register is to work out a specific Survey Programme prior to the commencement of any part of:

- the Renewal Survey
- the Intermediate Survey for oil tankers over 10 years of age.

The Survey Programme is to be in a written format. The Survey Programme at Intermediate Survey may consist of the Survey Programme at the previous Renewal Survey supplemented by the Executive Hull Summary of that Renewal Survey and later relevant survey reports.

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

The Survey Programme is to be in a written format. The survey is not to commence until the survey programme has been agreed.

5.1.1.1 Prior to the development of the survey programme, the survey planning questionnaire is to be completed by the owner, and forwarded to the Register.

5.1.2 In developing the Survey Programme, the following documentation is to be collected and consulted with a view to selecting tanks, areas, and structural elements to be examined:

- survey status and basic ship information;
- documentation on-board, as described in 6.2 and 6.3;
- main structural plans (scantlings drawings), including information regarding use of high tensile steels (HTS);
- Executive Hull Summary;
- relevant previous damage and repair history;
- relevant previous survey and inspection reports from both the Register and the Owner;
- 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 if any. Guidance for reporting is shown in Annex IVC of IACS UR Z10.4;
- 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); and
- any other information that will help identify suspect areas and critical structural areas.

5.1.3 The submitted Survey Programme is to account for and comply, as a minimum, with the requirements of Tables I, II, and 2.5 for close-up survey, thickness measurement and tank testing, respectively, and is to include relevant information including at least:

- basic ship information and particulars;
- main structural plans (scantlings drawings), including information regarding use of high tensile steels (HTS);
- plan of tanks;
- list of tanks with information on use, 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;
- nomination of tanks and areas for close-up survey (per 2.3);
- nominations of sections for thickness measurement (per 2.4);
- nomination of tanks for tank testing (per 2.5);
- identification of the thickness measurement firm;
- damage experience related to the ship in question;
- critical structural areas and suspect areas, where relevant.

5.1.4 The Register will advise the Owner of the maximum acceptable structural corrosion diminution levels applicable to the vessel.

5.2 CONDITIONS FOR SURVEY

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

5.2.1.1 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 Register and are to be in accordance with IACS PR 37.

5.2.1.2 Details of the means of access are to be provided in the survey planning questionnaire.
5.2.1.3 In cases where the provisions of safety and required access are judged by the attending surveyors not to be adequate, the survey of the spaces involved is to not proceed.

5.2.2 Tanks and spaces are to be safe for access. Tanks and spaces are to be gas free 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.

5.2.3 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 areas to be renewed.

5.2.4 Sufficient illumination is to be provided to reveal corrosion, deformation, fractures, damages or other structural deterioration.

5.2.5 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.

5.3 ACCESS TO STRUCTURES

5.3.1 For overall survey, means are to be provided to enable the Surveyor to examine the hull structure in a safe and practical way.

5.3.2 For close-up survey, 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;
- hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms;
- boats or rafts;
- other equivalent means.

5.4 EQUIPMENT FOR SURVEY

5.4.1 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.

5.4.2 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.

5.4.3 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.

5.4.4 Adequate and safe lighting is to be provided for the safe and efficient conduct of the survey.

5.4.5 Adequate protective clothing is to be made available and used during the survey (e.g. safety helmet, gloves, safety shoes, etc.).

5.5 RESCUE AND EMERGENCY RESPONSE EQUIPMENT

5.5.1 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.

5.6 SURVEY AT SEA OR AT ANCHORAGE

5.6.1 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 5.1, 5.2, 5.3 and 5.4.

5.6.2 A communication system is to be arranged between the survey party in the tank and the responsible officer on deck. This system is to include the personnel in charge of ballast pump handling if boats or rafts are used.

5.6.3 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 under foreseeable conditions and provided the expected rise of water within the tank does not exceed 0.25 m.

5.6.4 When rafts or boats are used for close-up surveys, 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, should be used;
.2 the boat or raft should be tethered to the access ladder and an additional person should be stationed down the access ladder with a clear view of the boat or raft;
.3 appropriate lifejackets should be available for all participants;
.4 the surface of water in the tank should be calm (under all foreseeable conditions the expected rise of water within the tank should not exceed 0.25 m) and the water level either stationary. On no account should 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 on the water is not acceptable;
.6 at no time should the water level 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 should only 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 should be used should be isolated to prevent a transfer of gas from other tanks (or spaces).

5.6.5 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.

5.6.6 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 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:

i. access direct from the deck via a vertical ladder and a small platform fitted approximately 2 m below the deck in each bay; or

ii. 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 3 m from the deck plate measured at the midspan of deck transverses and in the middle length of the tank (see Figure 4).

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.

Figure 4 Maximum water level in a tank

5.6.7 The use of rafts or boats alone in paragraphs 5.6.5 and 5.6.6 does not preclude the use of boats or rafts to move about within a tank during a survey.

NOTE: Reference is made to IACS Recommendation 39 – Guidelines for use of Boats or Rafts for Close-up Surveys.

5.7 SURVEY PLANNING MEETING

5.7.1 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.

5.7.2 Prior to the commencement of any part of the Renewal 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 to ascertain that all the arrangements envisaged in the survey programme are in place, so as to ensure the safe and efficient conduct of the survey work to be carried out. See also 7.1.2.

5.7.3 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/descaling, 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; and
.9 communication between attending surveyor(s) the thickness measurement firm operator(s) and owner representative(s) concerning findings.
6 DOCUMENTATION ON BOARD

6.1 GENERAL

6.1.1 The owner is to supply and maintain on board documentation as specified in 6.2 and 6.3, which is to be readily available for the Surveyor.

6.1.2 The documentation is to be kept on board for the lifetime of the ship.

6.1.3 For ships defined in the Rules, Part - General requirements, Ch. 2 - Survey during construction and initial survey, note in item 1.2.2.27, the following is to be applied to surveys commenced on or after 1st July 2016:

For tankers and bulk carriers subject to SO-LAS, 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.

6.2 SURVEY REPORT FILE

6.2.1 A Survey Report File is to be a part of the documentation on board consisting of:
- reports of structural surveys;
- Executive Hull Summary;
- thickness measurement reports.

6.2.2 The Survey Report File is to be available also in the Owner's and the Register's management offices.

6.3 SUPPORTING DOCUMENTS

6.3.1 The following additional documentation is to be available onboard:
- Survey Programme as required by 5.1 until such time as the Renewal Survey or Intermediate Survey, as applicable, has been completed;
- main structural plans of cargo and ballast tanks (for CSR ships these plans are to include for each structural element both the as-built and renewal thickness. Any thickness for voluntary addition is also to be clearly indicated on the plans. The midship section plan to be supplied on board the ship is to include the minimum allowable hull girder sectional properties for hold transverse section in all cargo tanks);
- previous repair history;
- cargo and ballast history;
- extent of use of inert gas plant and tank cleaning procedures;
- inspections by ship's personnel with reference to:
  - structural deterioration in general;
  - leakage in bulkheads and piping;
  - condition of coating or corrosion prevention system, if any;
  - any other information that will help identify Suspect Areas requiring inspection.

6.3.2 For tankers and bulk carriers subject to SO-LAS, 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.

6.4 REVIEW OF DOCUMENTATION ON BOARD

6.4.1 Prior to inspection, the Surveyor is to examine the completeness of the documentation onboard, and its contents as a basis for the survey.

6.4.2 For tankers and bulk carriers subject to SO-LAS, 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.

6.4.2.1 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.

6.4.2.2 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 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.

6.4.3 For tankers and bulk carriers subject to SO-LAS, 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.
7 PROCEDURES FOR THICKNESS MEASUREMENTS

7.1 GENERAL

7.1.1 Thickness measurements required, if not carried out by the Register itself, are to be witnessed by a Surveyor on board to the extent necessary to control the process.

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

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

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

7.2 CERTIFICATION OF THICKNESS MEASUREMENTS FIRM

7.2.1 The thickness measurements are to be carried out by a qualified firm certified by the Register according to principles stated in the Rules, Part I - General requirements, Ch. 4 - Approval of manufacturers and service suppliers.

7.3 NUMBER AND LOCATIONS OF MEASUREMENTS

7.3.1 Application

The item 7.3 only applies to vessels built under the IACS Common Structural Rules*. For vessels not built under IACS Common Structural Rules, the requirements for number and locations of measurements are according to the Rules of the Register and/or specific IACS URs depending on ship’s age and structural elements concerned.

* IACS Common Structural Rules mean IACS Common Structural Rules for Double Hull Oil Tankers (IACS CSR for Oil Tankers) or IACS Common Structural Rules for Bulk Carriers and Oil Tankers (IACS CSR BC & OT).

7.3.2 Number of measurements

Considering the extent of thickness measurements according to the different structural elements of the ship and surveys (Renewal, intermediate and annual), the locations of the points to be measured are given for the most important items of the structure.

7.3.3 Locations of measurements

Table 1 provides explanations and/or interpretations for the application of those requirements indicated in the Rules, which refer to both systematic thickness measurements related to the calculation of global hull girder strength and specific measurements connected to close-up surveys.

Fig 5 to Fig 8 are provided to facilitate the explanations and/or interpretations given in Table 1, to show typical arrangements of single side skin bulk carriers.

Table 1

<table>
<thead>
<tr>
<th>Item</th>
<th>Interpretation</th>
<th>Figure reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selected plates</td>
<td>«Selected» means at least a single point on one out of three plates, to be chosen on representative areas of average corrosion.</td>
<td></td>
</tr>
<tr>
<td>Deck, bottom plates and wind-and-water strakes</td>
<td>At least two points on each plate to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion.</td>
<td></td>
</tr>
<tr>
<td>Transverse section</td>
<td>Measurements to be taken on all longitudinal members such as plating, longitudinals and girders at the deck, side, bottom, longitudinal bulkheads, inner bottom and hopper. One point to be taken on each plate. Both web and flange to be measured on longitudinals, if applicable. For tankers older than 10 years of age: within 0.1D (where D is the ship’s moulded depth) of the deck and bottom at each transverse section to be measured, every longitudinal and girder is to be measured on the web and face plate, and every plate is to be measured at one point between longitudinals.</td>
<td>Fig 5</td>
</tr>
<tr>
<td>Item</td>
<td>Interpretation</td>
<td>Figure reference</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Transverse rings (*) in cargo and ballast tanks</td>
<td>At least two points on each plate in a staggered pattern and two points on the corresponding flange where applicable. Minimum 4 points on the first plate below deck. Additional points in way of curved parts. At least one point on each of two stiffeners between stringers / longitudinal girders.</td>
<td>Fig 6</td>
</tr>
<tr>
<td>Transverse bulkheads in cargo tanks</td>
<td>At least two points on each plate. Minimum 4 points on the first plate below main deck. At least one point on every third stiffener to be taken between each stringer. At least two points on each plate of stringers and girders, and two points on the corresponding flange. Additional points in way of curved part. Two points of each diaphragm plate of stools if fitted.</td>
<td>Fig 7</td>
</tr>
<tr>
<td>Transverse bulkheads in ballast tanks</td>
<td>At least 4 points on plates between stringers / longitudinal girders, or per plate if stringers / girders not fitted. At least two points on each plate of stringers and girders, and two points on the corresponding flange. Additional points in way of curved part. At least one point on two stiffeners between each stringer / longitudinal girder.</td>
<td>Fig 8</td>
</tr>
<tr>
<td>Adjacent structural members</td>
<td>On adjacent structural members one point per plate and one point on every third stiffener / longitudinal.</td>
<td></td>
</tr>
</tbody>
</table>

(*) Transverse rings means all transverse material appearing in a cross-section of the ship's hull, in way of a double bottom floor, vertical web and deck transverse (definition from CSR)
Figure 5 - Transverse section

Figure 6 - Transverse rings in cargo and ballast tanks
7.4 REPORTING

7.4.1 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 was carried out, type of measuring equipment, names of personnel and their qualifications and has to be signed by the operator.

7.4.2 The Surveyor is to verify and countersign the thickness measurement report. The Surveyor is to review the final thickness measurement report and countersign the cover page.
8 ACCEPTANCE CRITERIA

8.1 GENERAL

8.1.1 For vessels built under IACS Common Structural Rules (CSR), the Acceptance Criteria is according to Section 12 - Ship in Operation Renewal Criteria of IACS Common Structural Rules * (CSR) and as specified in 8.2, 8.3 and 8.4.

8.1.2 For vessels not built under IACS Common Structural Rules (CSR), the Acceptance Criteria are according to the Rules of the Register and/or specific IACS URs depending on ship’s age and structural elements concerned.

8.2 ACCEPTANCE CRITERIA FOR PITTING CORROSION OF CSR SHIPS

8.2.1 For plates with pitting intensity less than 20%, see Figure 1, the measured thickness, $t_m$, of any individual measurement is to meet the lesser of the following criteria:

$$t_m \geq 0.7 \times (t_{as-built} - t_{vol add}) \text{ mm}$$

$$t_m \geq t_{ren} - 1 \text{ mm}$$

where:

$t_{as-built}$ As-built thickness of the member, in mm
$t_{vol add}$ Voluntary thickness addition; thickness, in mm, voluntarily added as the Owner’s extra margin for corrosion wastage in addition to $t_C$
$t_{ren}$ renewal criteria for general corrosion as defined in IACS Common Structural Rules* (CSR)

* 1.4.2.1 of Section 12 of IACS CSR for Oil Tankers, or 2.1.1 of Sec. 2, Ch. 13, Part 1 of IACS CSR BC & OT

8.2.2 The average thickness across any cross section in the plating is not to be less than that defined in IACS CSR*.

* 1.4.2 of Section 12 of IACS CSR for Oil Tankers, or 2.1 of Sec. 2, Ch. 13, Part 1 of IACS CSR BC & OT

8.3 ACCEPTANCE CRITERIA FOR EDGE CORROSION OF CSR SHIPS

8.3.1 Provided that the overall corroded height of the edge corrosion of the flange, or web in the case of flat bar stiffeners, is less than 25%, see Figure 2, of the stiffener flange breadth or web height, as applicable, the measured thickness, $t_m$, is to meet the lesser of the following criteria:

$$t_m \geq 0.7 \times (t_{as-built} - t_{vol add}) \text{ mm}$$

$$t_m \geq t_{ren} - 1 \text{ mm}$$

where:

$t_{as-built}$ as-built thickness of the member, in mm
$t_{vol add}$ voluntary thickness addition; thickness, in mm, voluntarily added as the Owner’s extra margin for corrosion wastage in addition to $t_C$
$t_{ren}$ renewal criteria for general corrosion as defined in IACS Common Structural Rules* (CSR)

* 1.4.2 of Section 12 of IACS CSR for Oil Tankers, or 2.1 of Sec. 2, Ch. 13, Part 1 of IACS CSR BC & OT

8.3.2 Plate edges at openings for manholes, lightening holes etc. may be below the minimum thickness given in IACS CSR*:

a) the maximum extent of the reduced plate thickness, below the minimum given in IACS CSR*, from the opening edge is not more than 20% of the smallest dimension of the opening and does not exceed 100mm.

b) rough or uneven edges may be cropped-back provided that the maximum dimension of the opening is not increased by more than 10% and the remaining thickness of the new edge is not less than $t_{ren} - 1\text{ mm}$.

* 1.4.2 of Section 12 of IACS CSR for Oil Tankers, or 2.1 of Sec. 2, Ch. 13, Part 1 of IACS CSR BC & OT

8.4 ACCEPTANCE CRITERIA FOR GROOVING CORROSION OF CSR SHIPS

8.4.1 Where the groove breadth is a maximum of 15% of the web height, but not more than 30mm, see Figure 3, the measured thickness, $t_m$, in the grooved area is to meet the lesser of the following criteria:

$$t_m \geq 0.75 \times (t_{as-built} - t_{vol add}) \text{ mm}$$

$$t_m \geq t_{ren} - 0.5 \text{ mm}$$

but is not to be less than:

$t_m = 6 \text{ mm}$

where:

$t_{as-built}$ as-built thickness of the member, in mm
$t_{vol add}$ voluntary thickness addition; thickness, in mm, voluntarily added as the Owner’s extra margin for corrosion wastage in addition to $t_C$
$t_{ren}$ renewal criteria for general corrosion as defined in IACS CSR*.

* 1.4.2 of Section 12 of IACS CSR for Oil Tankers, or 2.1 of Sec. 2, Ch. 13, Part 1 of IACS CSR BC & OT

8.4.2 Structural members with areas of grooving greater than those in 8.4.1 above are to be assessed based on the criteria for general corrosion as defined in IACS CSR* using the average measured thickness across the plating/stiffener.
9 REPORTING AND EVALUATION OF SURVEY

9.1 EVALUATION OF SURVEY REPORT

9.1.1 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.

9.1.1.1 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 is to be evaluated by using the thickness of structural members measured, renewed and reinforced, as appropriate, during the Renewal survey 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 Annex III of IACS UR Z10.4 and in the Rules, Part 2 – Hull, Annex B.

9.1.1.2 The final result of evaluation of the ship’s longitudinal strength required in 8.1.1.1, after renewal or reinforcement work of structural members, if carried out as a result of initial evaluation, is to be reported as a part of the Executive Hull Summary.

9.2 REPORTING

9.2.1 Principles for survey reporting are shown in the Annex II of IACS UR Z10.4.

9.2.2 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.

9.2.3 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 the Head Office of the Register.
### Table I
MINIMUM REQUIREMENTS FOR CLOSE-UP SURVEY AT RENEWAL SURVEY OF DOUBLE HULL OIL TANKERS

<table>
<thead>
<tr>
<th>I Renewal Survey</th>
<th>II Renewal Survey</th>
<th>III Renewal Survey</th>
<th>IV Renewal Survey and Subsequent</th>
</tr>
</thead>
<tbody>
<tr>
<td>age ≤ 5</td>
<td>5 &lt; age ≤ 10</td>
<td>10 &lt; age ≤ 15</td>
<td>age &gt; 15</td>
</tr>
<tr>
<td>One web frame (1), in a ballast tank (see Note 1)</td>
<td>All web frames (1), in a ballast tank (see Note 1)</td>
<td>The knuckle area and the upper part (5 metres approximately) of one web frame in each remaining ballast tank (6)</td>
<td>All web frames (1), in all ballast tanks</td>
</tr>
</tbody>
</table>

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 ballast tank (see Note 1) | One transverse bulkhead (4), in each 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 centre tank | One transverse bulkhead (5), in two cargo oil centre tanks | | |

One transverse bulkhead (5), in a cargo oil wing tank (see Note 2) | 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 figures in Annex D).

(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 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 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 double bottom 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.
## Table II
MINIMUM REQUIREMENTS TO THICKNESS MEASUREMENTS AT RENEWAL SURVEY OF DOUBLE HULL OIL TANKERS

<table>
<thead>
<tr>
<th>I Renewal Survey age ≤ 5</th>
<th>II Renewal Survey 5 &lt; age ≤ 10</th>
<th>III Renewal Survey 10 &lt; age ≤ 15</th>
<th>IV Renewal Survey and Subsequent age &gt; 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Suspect areas</td>
<td>1. Suspect areas</td>
<td>1. Suspect areas</td>
<td>1. Suspect areas</td>
</tr>
<tr>
<td>2. One section of deck plating for the full beam of the ship within cargo area</td>
<td>2. Within the cargo area: each deck plate - one transverse section</td>
<td>2. Within the cargo area: each deck plate - two transverse sections (I) - all wind and water strakes</td>
<td>2. Within the cargo area: each deck plate - three transverse sections (I) - each bottom plate</td>
</tr>
<tr>
<td>3. Selected wind and water strakes outside the cargo area</td>
<td>3. Selected wind and water strakes outside the cargo area</td>
<td>3. All wind and water strakes, full length</td>
<td></td>
</tr>
<tr>
<td>4. Measurements for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.</td>
<td>4. Measurements for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.</td>
<td>4. Measurements for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.</td>
<td></td>
</tr>
</tbody>
</table>

(I): at least one section is to include a ballast tank within 0.5 L amidships.

## Table III
MINIMUM REQUIREMENTS FOR TANK TESTING AT RENEWAL SURVEY OF DOUBLE HULL OIL TANKERS

<table>
<thead>
<tr>
<th>Age of ship (in years at time of renewal survey due date)</th>
<th>I Renewal Survey age ≤ 5</th>
<th>II Renewal Survey and Subsequent age &gt; 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>All ballast tank boundaries</td>
<td>All ballast tank boundaries</td>
<td></td>
</tr>
<tr>
<td>Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, pump rooms or cofferdams</td>
<td>All cargo tank boundaries</td>
<td></td>
</tr>
</tbody>
</table>

## Table IV, Sheet 1
REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION - RENEWAL SURVEY OF DOUBLE HULL OIL TANKERS WITHIN THE CARGO AREA LENGTH

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom, inner bottom and hopper structure plating</td>
<td>Minimum of three bays across double bottom tank, including aft bay Measurements around and under all suction bell mouths</td>
<td>5-point pattern for each panel between longitudinals and floors</td>
</tr>
<tr>
<td>Bottom, inner bottom and hopper structure longitudinals</td>
<td>Minimum of three longitudinals in each bay where bottom plating measured</td>
<td>Three measurements in line across flange and three measurements on vertical web</td>
</tr>
</tbody>
</table>
### BOTTOM, INNER BOTTOM AND HOPPER STRUCTURE

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom girders, including the watertight ones</td>
<td>At fore and aft watertight floors and in centre of tanks</td>
<td>Vertical line of single measurements on girder plating with one measurement between each panel stiffener, or a minimum of three measurements</td>
</tr>
<tr>
<td>Bottom floors, including the watertight ones</td>
<td>Three floors in bays where bottom plating measured, with measurements at both ends and middle</td>
<td>5-point pattern over two square metre area</td>
</tr>
<tr>
<td>Hopper structure web frame ring</td>
<td>Three floors in bays where bottom plating measured</td>
<td>5-point pattern over one square metre of plating. Single measurements on flange</td>
</tr>
<tr>
<td>Hopper structure transverse watertight bulkhead or swash bulkhead</td>
<td>- lower 1/3 of bulkhead</td>
<td>5-point pattern over one square metre of plating</td>
</tr>
<tr>
<td></td>
<td>- upper 2/3 of bulkhead</td>
<td>5-point pattern over two square metre of plating</td>
</tr>
<tr>
<td></td>
<td>- stiffeners (minimum of three)</td>
<td>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</td>
</tr>
<tr>
<td>Panel stiffening</td>
<td>Where applicable</td>
<td>Single measurements</td>
</tr>
</tbody>
</table>

### DECK STRUCTURE

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deck plating</td>
<td>Two transverse bands across tank</td>
<td>Minimum of three measurements per plate per band</td>
</tr>
<tr>
<td>Deck longitudinals</td>
<td>Every third longitudinal in each of two bands with a minimum of one longitudinal</td>
<td>Three measurements in line vertically on webs and two measurements on flange (if fitted)</td>
</tr>
<tr>
<td>Deck girders and brackets (usually in cargo tanks only)</td>
<td>At fore and aft transverse bulkhead, bracket toes and in centre of tanks</td>
<td>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</td>
</tr>
<tr>
<td>Deck transverse webs</td>
<td>Minimum of two webs, with measurements at both ends and middle of span</td>
<td>5-point pattern over one square metre area. Single measurements on flange</td>
</tr>
<tr>
<td>Vertical web and transverse bulkhead in wing ballast tank (two metres from deck)</td>
<td>Minimum of two webs, and both transverse bulkheads</td>
<td>5-point pattern over one square metre area</td>
</tr>
<tr>
<td>Panel stiffening</td>
<td>Where applicable</td>
<td>Single measurements</td>
</tr>
</tbody>
</table>
### REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION - RENEWAL SURVEY OF DOUBLE HULL OIL TANKERS WITHIN THE CARGO AREA LENGTH

In Table IV, Sheet 3, the requirements for the extent of thickness measurements at specific areas of substantial corrosion in wing ballast tanks of double hull oil tankers are detailed. The table outlines the structural members, extent of measurement, and pattern of measurement for different parts of the ship's structure. Below is the content of the table in markdown format:

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side shell and longitudinal bulkhead plating:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- upper strake and strakes in way of horizontal girders</td>
<td>Plating between each pair of longitudinals in a minimum of three bays (along the tank)</td>
<td>Single measurement</td>
</tr>
<tr>
<td>- all other strakes</td>
<td>Plating between every third pair of longitudinals in same three bays</td>
<td>Single measurement</td>
</tr>
<tr>
<td>Side shell and longitudinal bulkhead longitudinals on:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- upper strake</td>
<td>Each longitudinal in same three bays</td>
<td>3 measurements across web and 1 measurement on flange</td>
</tr>
<tr>
<td>- all other strakes</td>
<td>Every third longitudinal in same three bays</td>
<td>3 measurements across web and 1 measurement on flange</td>
</tr>
<tr>
<td>Longitudinals - brackets</td>
<td>Minimum of three at top, middle and bottom of tank in same three bays</td>
<td>5-point pattern over area of bracket</td>
</tr>
<tr>
<td>Vertical web and transverse bulkheads (excluding deckhead area):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- strakes in way of horizontal girders</td>
<td>Minimum of two webs and both transverse bulkheads</td>
<td>5-point pattern over approx. two square metre area</td>
</tr>
<tr>
<td>- other strakes</td>
<td>Minimum of two webs and both transverse bulkheads</td>
<td>two measurements between each pair of vertical stiffeners</td>
</tr>
<tr>
<td>Horizontal girders</td>
<td>Plating on each girder in a minimum of three bays</td>
<td>Two measurements between each pair of longitudinal girder stiffeners</td>
</tr>
<tr>
<td>Panel stiffening</td>
<td>Where applicable</td>
<td>Single measurements</td>
</tr>
</tbody>
</table>
Table IV, Sheet 4

REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION - RENEWAL SURVEY OF DOUBLE HULL OIL TANKERS WITHIN THE CARGO AREA LENGTH

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LONGITUDINAL BULKHEADS IN CARGO TANKS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Deckhead and bottom strakes, and strakes in way of the horizontal stringers of transverse bulkheads</strong></td>
<td>Plating between each pair of longitudinals in a minimum of three bays</td>
<td>Single measurement</td>
</tr>
<tr>
<td><strong>All other strakes</strong></td>
<td>Plating between every third pair of longitudinals in same three bays</td>
<td>Single measurement</td>
</tr>
<tr>
<td><strong>Longitudinals on deckhead and bottom strakes</strong></td>
<td>Each longitudinal in same three bays</td>
<td>Three measurements across web and one measurement on flange</td>
</tr>
<tr>
<td><strong>All other longitudinals</strong></td>
<td>Every third longitudinal in same three bays</td>
<td>Three measurements across web and one measurement on flange</td>
</tr>
<tr>
<td><strong>Longitudinals - brackets</strong></td>
<td>Minimum of three at top, middle and bottom of tank in same three bays</td>
<td>5-point pattern over area of bracket</td>
</tr>
<tr>
<td><strong>Web frames and cross ties</strong></td>
<td>Three webs with minimum of three locations on each web, including in way of cross tie connections</td>
<td>5-point pattern over approximately two square metre area of webs, plus single measurements on flanges of web frame and cross ties</td>
</tr>
<tr>
<td><strong>Lower end brackets (opposite side of web frame)</strong></td>
<td>Minimum of three brackets</td>
<td>5-point pattern over approximately two square metre area of brackets, plus single measurements on bracket flanges</td>
</tr>
</tbody>
</table>

Table IV, Sheet 5

REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION - RENEWAL SURVEY OF DOUBLE HULL OIL TANKERS WITHIN THE CARGO AREA LENGTH

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRANSVERSE WATERTIGHT AND SWASH BULKHEADS IN CARGO TANKS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Upper and lower stool, where fitted</strong></td>
<td>Transverse band within 25 mm of welded connection to inner bottom/deck plating</td>
<td>5-point pattern between stiffeners over one metre length</td>
</tr>
<tr>
<td></td>
<td>Transverse band within 25 mm of welded connection to shelf plate</td>
<td></td>
</tr>
<tr>
<td><strong>Deckhead and bottom strakes, and strakes in way of horizontal stringers</strong></td>
<td>Plating between pair of stiffeners at three locations : approximately 1/4, 1/2 and 3/4 width of tank</td>
<td>5-point pattern between stiffeners over one metre length</td>
</tr>
<tr>
<td><strong>All other strakes</strong></td>
<td>Plating between pair of stiffeners at middle location</td>
<td>Single measurement</td>
</tr>
<tr>
<td><strong>Strakes in corrugated bulkheads</strong></td>
<td>Plating for each change of scantling at centre of panel and at flange of fabricated connection</td>
<td>5-point pattern over about one square metre of plating</td>
</tr>
<tr>
<td><strong>Stiffeners</strong></td>
<td>Minimum of three typical stiffeners</td>
<td>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</td>
</tr>
<tr>
<td><strong>Brackets</strong></td>
<td>Minimum of three at top, middle and bottom of tank</td>
<td>5-point pattern over area of bracket</td>
</tr>
<tr>
<td><strong>Horizontal stringers</strong></td>
<td>All stringers with measurements at both ends and middle</td>
<td>5-point pattern over one square metre area, plus single measurements near bracket toes and on flanges</td>
</tr>
</tbody>
</table>
Table V
MINIMUM REQUIREMENTS FOR OVERALL AND CLOSE-UP SURVEY AND THICKNESS MEASUREMENTS AT INTERMEDIATE SURVEY OF DOUBLE HULL OIL TANKERS

<table>
<thead>
<tr>
<th>AGE OF SHIP AT TIME OF INTERMEDIATE SURVEY DUE DATE</th>
<th>5 &lt; age ≤ 10</th>
<th>10 &lt; age ≤ 15</th>
<th>age &gt; 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall survey of Representative ballast tanks selected by the attending surveyor (see 4.2.2)</td>
<td>The requirements of the previous Renewal Survey (see 4.2.3)</td>
<td>The requirements of the previous Renewal Survey (see 4.2.4)</td>
<td></td>
</tr>
<tr>
<td>Suspect areas identified at previous surveys are to be examined (see 4.2.2)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table VI
Note: Table VI is retitled as Annex IVC and is available in IACS UR Z.10.4
ANNEX C1
Hull Surveys of Single Skin Bulk Carriers
Annex C1  HULL SURVEYS OF SINGLE SKIN BULK CARRIERS

Contents:

1  GENERAL ................................................................. 1
   1.1  APPLICATION .................................................. 1
   1.2  DEFINITIONS .................................................. 1
   1.3  REPAIRS .......................................................... 4
   1.4  THICKNESS MEASUREMENTS AND CLOSE-UP SURVEYS .................................................. 4

2  RENEWAL (SPECIAL) SURVEY ........................................... 5
   2.1  SCHEDULE ....................................................... 5
   2.2  SCOPE .................................................................. 5
   2.3  EXTENT OF OVERALL AND CLOSE-UP SURVEYS .................................................. 6
   2.4  EXTENT OF THICKNESS MEASUREMENTS .......................................................... 6
   2.5  EXTENT OF TANK TESTING ........................................ 7
   2.6  ADDITIONAL RENEWAL SURVEY REQUIREMENTS AFTER DETERMINING COMPLIANCE WITH SOLAS XII/12 AND XII/13 .................................................. 7

3  ANNUAL SURVEY ........................................................... 8
   3.1  SCHEDULE .......................................................... 8
   3.2  SCOPE .................................................................. 8
   3.3  ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR THE FOREMOST CARGO HOLD OF SHIPS SUBJECT TO SOLAS XII/9.1 .................................................. 10
   3.4  ADDITIONAL ANNUAL SURVEY REQUIREMENTS AFTER DETERMINING COMPLIANCE WITH SOLAS XII/12 AND XII/13 .................................................. 10

4  INTERMEDIATE SURVEY .................................................. 11
   4.1  SCHEDULE .......................................................... 11
   4.2  SCOPE .................................................................. 11

5  PREPARATION FOR SURVEY ........................................... 13
   5.1  SURVEY PROGRAMME ......................................... 13
   5.2  CONDITIONS FOR SURVEY ..................................... 13
   5.3  ACCESS TO STRUCTURES ......................................... 14
   5.4  EQUIPMENT FOR SURVEY ...................................... 14
   5.5  RESCUE AND EMERGENCY RESPONSE EQUIPMENT .................................................. 15
   5.6  SURVEY AT SEA OR AT ANCHORAGE .................................................. 15
   5.7  SURVEY PLANNING MEETING ....................................... 15

6  DOCUMENTATION ON BOARD ........................................ 17
   6.1  GENERAL .......................................................... 17
   6.2  SURVEY REPORT FILE ........................................ 17
   6.3  SUPPORTING DOCUMENTS ....................................... 17
   6.4  REVIEW OF DOCUMENTATION ON BOARD .................................................. 17

7  PROCEDURES FOR THICKNESS MEASUREMENTS .................... 18
   7.1  GENERAL .......................................................... 18
   7.2  CERTIFICATION OF THICKNESS MEASUREMENTS FIRM .................................................. 18
   7.3  NUMBER AND LOCATIONS OF MEASUREMENTS .................................................. 18
   7.4  REPORTING ........................................................ 24

8  ACCEPTANCE CRITERIA .................................................. 25
   8.1  GENERAL .......................................................... 25
   8.2  ACCEPTANCE CRITERIA FOR PITTING CORROSION OF CSR SHIPS .................................................. 25
   8.3  ACCEPTANCE CRITERIA FOR EDGE CORROSION OF CSR SHIPS .................................................. 25
   8.4  ACCEPTANCE CRITERIA FOR GROOVING CORROSION OF CSR SHIPS .................................................. 26

9  REPORTING AND EVALUATION OF SURVEY ......................... 27
   9.1  EVALUATION OF SURVEY REPORT .................................................. 27
   9.2  REPORTING ........................................................ 27
1 GENERAL

1.1 APPLICATION

1.1.1 The requirements apply to all self-propelled Bulk Carriers other than Double Skin Bulk Carriers.

1.1.2 The Requirements 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. The requirements are additional to the classification requirements applicable to the remainder of the ship. Refer to subtitles 4.2, 5.2 and 7.2 in the Rules, Part 1 - General requirements, Ch. 5 - Surveys of ships in service.

1.1.3 The requirements contain the minimum extent of examination, thickness measurement 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.

1.1.4 Ships which are required to comply with UR S19 are subject to the additional thickness measurement guidance contained in Annex III with respect to the vertically corrugated transverse watertight bulkhead between cargo holds Nos. 1 and 2 for purposes of determining compliance with UR S19 prior to the relevant compliance deadline stipulated in UR S23 and at subsequent intermediate surveys (for ships over 10 years of age) and Renewal surveys for purposes of verifying continuing compliance with UR S19.

1.1.5 Ships which are required to comply with UR S31 are subject to the additional thickness measurement guidance contained in Annex V with respect to the side shell frames and brackets for the purposes of determining compliance with UR S31 prior to the relevant compliance deadline stipulated in UR S31 and at subsequent intermediate and Renewal surveys for purposes of verifying continuing compliance with UR S31.

1.1.6 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 Annex C are to apply to cargo holds of double side skin and associated wing spaces.

1.2 DEFINITIONS

1.2.1 Bulk Carrier

A Bulk Carrier is a ship which is constructed generally with single deck, double bottom, topside tanks and hopper side tanks in cargo spaces, and is intended primarily to carry dry cargo in bulk. Combination carriers are included. Ore and combination carriers are not covered by the IACS Common Structural Rules.

1.2.2 Ballast Tank

A Ballast Tank is a tank which is used solely for salt water ballast, or, where applicable, a space which is used for both cargo and salt water ballast will be treated as a Ballast tank when substantial corrosion has been found in that space.

1.2.3 Spaces

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

1.2.4 Overall Survey

An Overall Survey is a survey intended to report on the overall conditions of the hull structure and determine the extent of additional Close-Up Surveys.

1.2.5 Close-up Survey

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 reach of hand.

1.2.6 Transverse Section

A Transverse Section includes all longitudinal members such as plating, longitudinals and girders at the deck, sides, bottom; inner bottom hopper sides, longitudinal bulkheads and bottom in top wing tanks.

For transversely framed vessels, a transverse section includes adjacent frames and their end connections in way of transverse sections.

1.2.7 Representative Spaces

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

1.2.8 Suspect Areas

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

1.2.9 Critical Structural Areas

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.

1.2.10 Renewal Thickness

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

1.2.11 Substantial Corrosion

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 measured thickness between $t_{ren} + 0.5\text{mm}$ and $t_{ren}$.

1.2.12 Corrosion Prevention System

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.

1.2.13 Coating condition

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.

1.2.14 Cargo Length Area

Cargo Length Area is that part of the ship which includes cargo holds and adjacent areas including fuel tanks, cofferdams, ballast tanks and void spaces.

1.2.15 Special consideration

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.

1.2.16 Prompt and Thorough Repair

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 classification, or recommendation.

1.2.17 Pitting Corrosion

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 1.

1.2.18 Edge Corrosion

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 2.

1.2.19 Grooving Corrosion

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.

![Figure 1 - Pitting intensity diagrams](image-url)
Figure 2 - Edge corrosion

Figure 3 - Grooving corrosion
1.3 REPAIRS

1.3.1 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 structure and side plating;
- deck structure and deck plating;
- inner bottom structure and inner bottom plating;
- inner side structure and inner side plating;
- watertight or oiltight bulkheads;
- hatch covers and hatch coamings;
- items in 3.2.3.10.

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.

1.3.2 Additionally, when a survey results in the identification of structural defects or corrosion, 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.

1.3.3 Where the damage found on structure mentioned in Para. 1.3.1 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 weather tight integrity and impose a Recommendation/Condition of Class in accordance with IACS PR 35, with a specific time limit.

1.4 THICKNESS MEASUREMENTS AND CLOSE-UP SURVEYS

1.4.1 In any kind of survey, i.e. Renewal, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by Table II, of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.
2 RENEWAL (SPECIAL) SURVEY

2.1 SCHEDULE

2.1.1 Renewal surveys are to be carried out at 5 year intervals to renew the Certificate of Class.

2.1.2 The first Renewal survey is to be completed within 5 years from the date of the initial survey and thereafter within 5 years from the credited date of the previous Renewal 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 Renewal survey before the extension was granted.

2.1.3 For surveys completed within 3 months before the expiry date of the Renewal survey, the next period of validity of certificate will start from the expiry date of the Renewal survey. For surveys completed more than 3 months before the expiry date of the Renewal survey, the period of validity of certificate 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 Renewal survey. If the owner elects to carry out the next due Renewal survey, the period of class will start from the survey completion date.

2.1.4 The Renewal survey may be commenced at the 4th annual survey and be progressed with a view to completion by the 5th anniversary date. When the Renewal 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 Renewal survey.

2.1.5 Concurrent crediting to both Intermediate survey and Renewal survey for surveys and thickness measurements of spaces are not acceptable.

2.2 SCOPE

2.2.1 General

2.2.1.1 The Renewal 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 2.2.1.3, 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.

2.2.1.2 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 2.4 and 2.5, 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.

2.2.1.3 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.

2.2.1.4 The survey extent of ballast tanks converted to void spaces is to be specially considered in relation to the requirements for ballast tanks.

2.2.2 Dry Dock Survey

2.2.2.1 A survey in dry dock is to be a part of the Renewal 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 Renewal 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.

2.2.3 Tank Protection

2.2.3.1 Where provided, the condition of the corrosion prevention system of ballast tanks is to be examined. For ballast tanks, excluding double bottom tanks, where the protective coating is found in POOR condition, and it is not renewed, where soft or semi-hard coating has been applied, or where a 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 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 the 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.

2.2.3.2 Where a hard protective coating is provided in cargo holds and is found in GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered.

2.2.4 Hatch Covers and Coamings

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

2.2.4.1 A thorough inspection of the items listed in 3.2.3 is to be carried out, in addition to all hatch covers and coamings.

2.2.4.2 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.
2.2.4.3 Checking the effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent.

2.2.4.4 Close-up survey and thickness measurement of the hatch cover and coaming plating and stiffeners is to be carried out as given in Table I and Table II. 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.

2.3 EXTENT OF OVERALL AND CLOSE-UP SURVEYS

2.3.1 An overall survey of all tanks and spaces is to be carried out at each Renewal survey. Fuel oil tanks in the cargo length area are to be surveyed as follows:

<table>
<thead>
<tr>
<th>I Renewal survey (age ≤ 5)</th>
<th>II Renewal survey (5 &lt; age ≤ 10)</th>
<th>III Renewal survey (10 &lt; age ≤ 15)</th>
<th>IV Renewal survey and Subsequent (age &gt; 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>One</td>
<td>Two</td>
<td>Half, minimum Two</td>
</tr>
</tbody>
</table>

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 Renewal survey, on a rotational basis.
(3) Peak tanks (all uses) are subject to internal examination at each Renewal survey.
(4) At Renewal survey no 3 and subsequent surveys, one deep tank for fuel oil in the cargo area is to be included if fitted.

2.3.2 The minimum requirements for close-up surveys at Renewal survey are given in Table I.

2.3.3 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.

2.3.4 For areas in spaces where hard protective coatings are found to be in a GOOD condition, the extent of close-up surveys according to Table I may be specially considered by the Register, refer also to 2.2.3.2.

2.4 EXTENT OF THICKNESS MEASUREMENTS

2.4.1 The minimum requirements for thickness measurements at Renewal surveys are given in Table II.

For additional thickness measurement guidelines applicable to the vertically corrugated transverse watertight bulkhead between cargo hold Nos. 1 and 2 on ships subject to compliance with UR S19 and UR S23, reference is to be made to 1.1.4.

For additional thickness measurement guidelines applicable to the side shell frames and brackets on ships subject to compliance with UR S31, reference is to be made to 1.1.5.

2.4.2 Provisions for extended measurements for areas with Substantial Corrosion are given in Table VIII and as may be additionally specified in the Survey Programme as required by 5.1. 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.

2.4.3 The Surveyor may further extend the thickness measurements as deemed necessary.

2.4.4 For areas in tanks where hard protective coatings are found to be in a GOOD condition, the extent of thickness measurements according to Table II may be specially considered. Refer also to 2.2.3.2.

2.4.5 Transverse sections are to be chosen where largest reductions are suspected to occur or are revealed from deck plating measurements, one of which is to be in the amidships area.
2.4.6 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.

2.5 EXTENT OF TANK TESTING

2.5.1 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.

2.5.2 The Surveyor may extend the tank testing as deemed necessary.

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

2.5.4 Boundaries of ballast holds are to be tested with a head of liquid to near to the top of hatches.

2.5.5 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.

2.5.6 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 tank top is carried out.

2.6 ADDITIONAL RENEWAL SURVEY REQUIREMENTS AFTER DETERMINING COMPLIANCE WITH SOLAS XII/12 AND XII/13

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

2.6.2 For ships complying with the requirements of SOLAS XII/13 for the availability of pumping systems, the Renewal 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.
3 ANNUAL SURVEY

3.1 SCHEDULE

3.1.1 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 Renewal survey.

3.2 SCOPE

3.2.1 General

3.2.1.1 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 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 Examination of the hull

3.2.2.1 Examination of the hull plating and its closing appliances as far as can be seen.

3.2.2.2 Examination of watertight penetrations as far as practicable.

3.2.3 Examination of weather decks, hatch covers and coamings

3.2.3.1 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.

3.2.3.2 A thorough survey of cargo hatch covers and coamings is only possible by examination in the open as well as closed positions and should 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.

3.2.3.3 If there are indications of difficulty in operating and securing hatch covers, additional sets above those required by 3.2.3.2, at the discretion of the surveyor, are to be tested in operation.

3.2.3.4 Where the cargo hatch securing system does not function properly, repairs are to be carried out under the supervision of the Register. Where hatch covers or coamings undergo substantial repairs, the strength of securing devices should be upgraded to comply with S21.5 of UR S21.

3.2.3.5 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 gypsy;
.10 hydraulic system, electrical safety devices and interlocks; and
.11 end and interpanel hinges, pins and stools where fitted.

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

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

3.2.3.8 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, 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).

3.2.3.9 Examination of flame screens on vents to all bunker tanks.

3.2.3.10 Examination of bunker and vent piping systems, including ventilators.
3.2.4 Examination of Cargo Holds

3.2.4.1 Bulk Carriers 10-15 years of age. The following is to apply:

a) Overall survey of all cargo holds.

b) Close-up survey 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 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.

c) 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, the extent of thickness measurements is to be increased in accordance with Table VIII. 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.

d) Where a hard protective coating is fitted in cargo holds, as defined in 1.2.13, and is found in GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered.

e) All piping and penetrations in cargo holds, including overboard piping, are to be examined.

3.2.4.2 Bulk Carriers over 15 years of age, the following is to apply:

a) Overall survey of all cargo holds.

b) Close-up survey 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 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.

c) 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, the extent of thickness measurements is to be increased in accordance with Table VIII. 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.

d) Where a hard protective coating is fitted in cargo holds, as defined in 1.2.13, and is found in GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered.

e) All piping and penetrations in cargo holds, including overboard piping, are to be examined.

3.2.5 Examination of ballast tanks

3.2.5.1 Examination of Ballast Tanks when required as a consequence of the results of the Renewal 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 VIII. 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.
3.3 ADDITIONAL ANNUAL SURVEY REQUIREMENTS FOR THE FOREMOST CARGO HOLD OF SHIPS SUBJECT TO SOLAS XII/9.1

3.3.1 Ships subject to SOLAS XII/9.1 are those meeting all the following conditions:
- Bulk Carriers of 150m 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 (see Note 1) 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.

3.3.2 In accordance with SOLAS XII/9.1, for the foremost cargo hold of such ships, the additional survey requirements shall apply.

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. For further details regarding the date of “contract for construction”, refer to IACS Procedural Requirement (PR) No.29.

3.4 ADDITIONAL ANNUAL SURVEY REQUIREMENTS AFTER DETERMINING COMPLIANCE WITH SOLAS XII/12 AND XII/13

3.4.1 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.

3.4.2 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.
4 INTERMEDIATE SURVEY

4.1 SCHEDULE

4.1.1 The Intermediate Survey is to be held at or between either the 2nd or 3rd annual survey.

4.1.2 Those items, which are additional to the requirements of the annual survey, may be surveyed either at or between the 2nd and 3rd annual survey.

4.1.3 Concurrent crediting to both Intermediate survey and Renewal survey for surveys and thickness measurements of spaces are not acceptable.

4.2 SCOPE

4.2.1 General

4.2.1.1 The survey extent is dependent on the age of the vessel as specified in 4.2.2 to 4.2.4.

4.2.2 Bulk Carriers 5 - 10 years of age

The following is to apply:

4.2.2.1 Ballast Tanks

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 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 protective coating is found in POOR condition, and it is not renewed, or where soft or semi-hard coating has been applied, or where a 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 coating is found in ballast double bottom tanks, or where a soft or semi-hard coating has been applied, or where a 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.

4.2.2.2 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 survey as described in 4.2.2.2a, 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.

4.2.2.3 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 4.2.2.2a. The minimum requirement for thickness measurements at the Intermediate Survey are areas found to be Suspect Areas at 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.

c) Where Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with the requirements of Table VIII. 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:

- 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;
- required to be measured at annual intervals.
d) Where the hard protective coating in cargo holds, as defined in 1.2.13, is found to be in GOOD condition, 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.

4.2.3 Bulk Carriers 10 – 15 years of age

The following is to apply:

4.2.3.1 The requirements of the intermediate survey are to be to the same extent as the previous Renewal survey as required in 2 and 5.1. However, internal examination of fuel oil tanks and pressure testing of all tanks are not required unless deemed necessary by the attending Surveyor.

4.2.3.2 In application of 4.2.3.1, 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 2.1.4.

4.2.3.3 In application of 4.2.3.1, an underwater survey may be considered in lieu of the requirement of 2.2.2.

4.2.4 Bulk Carriers over 15 years of age

The following is to apply:

4.2.4.1 The requirements of the intermediate survey are to be to the same extent as the previous Renewal survey as required in 2 and 5.1.

However, internal examination of fuel oil tanks and pressure testing of all tanks are not required unless deemed necessary by the attending Surveyor.

4.2.4.2 In application of 4.2.4.1, 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 2.1.4.

4.2.4.3 In application of 4.2.4.1, 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 PREPARATION FOR SURVEY

5.1 SURVEY PROGRAMME

5.1.1 The Owner in co-operation with the Register is to work out a specific Survey Programme prior to the commencement of any part of:
- the Renewal Survey
- the Intermediate Survey for bulk carriers over 10 years of age.

The Survey Programme is to be in a written format. The survey is not to commence until the Survey programme has been agreed.

5.1.1.1. Prior to the development of the survey programme, the survey planning questionnaire is to be completed by the owner, and forwarded to the Register.

5.1.1.2 The Survey Programme at Intermediate Survey may consist of the Survey Programme at the previous Renewal survey supplemented by the Executive Hull Summary of that Renewal survey and later relevant survey reports.

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

5.1.2 In developing the survey programme, the following documentation is to be collected and consulted with a view to selecting holds, tanks, areas, and structural elements to be examined:
- survey status and basic ship information,
- documentation on-board, as described in 6.2 and 6.3,
- main structural plans (scantlings drawings), including information regarding use of high tensile steels (HTS),
- relevant previous survey and inspection reports from both the Register and the Owner,
- information regarding the use of the ship’s holds and tanks, typical cargoes and other relevant data,
- information regarding corrosion prevention level on the newbuilding,
- information regarding the relevant maintenance level during operation.

5.1.3 The submitted survey programme is to account for and comply, as a minimum, with the requirements of Tables I and II and paragraph 2.5 for close-up survey, thickness measurement and tank testing, respectively, and is to include relevant information including at least:
- basic ship information and particulars,
- main structural plans (scantlings drawings), including information regarding use of high tensile steels (HTS)
- plan of holds and tanks,
- list of holds and tanks with information on use, protection and condition of coating.
- conditions for survey (e.g., information regarding hold and tank cleaning, gas freeing, ventilation, lighting, etc.),
- provisions and methods for access to structures,
- equipment for surveys,
- nomination of holds and tanks and areas for close-up survey (per 2.3),
- nominations of sections and areas for thickness measurement (per 2.4),
- nomination of tanks for tank testing (per 2.5),
- damage experience related to the ship in question.

5.1.4 The Register will advise the Owner of the maximum acceptable structural corrosion diminution levels applicable to the vessel.

5.2 CONDITIONS FOR SURVEY

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

5.2.1.1 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 Register and are to be in accordance with IACS PR 37.

5.2.1.2 Details of the means of access are to be provided in the survey planning questionnaire.

5.2.1.3 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.

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

5.2.3 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 areas to be renewed.

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

5.2.5 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.
5.3 ACCESS TO STRUCTURES

5.3.1 For overall surveys, means are to be provided to enable the Surveyor to examine the hull structure in a safe and practical way.

5.3.2 For close-up surveys of the hull structure, other than cargo hold shell frames, 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,
- hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms,
- portable ladders,
- boats or rafts,
- other equivalent means.

5.3.3 For close-up surveys of the cargo hold shell frames of bulk carriers less than 100,000 dwt, 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.

5.3.4 For close-up surveys of the cargo hold shell frames of 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 Renewal 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 Renewal 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 3.2.4.1.b, and the "one other selected cargo hold" required in 3.2.4.2.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.

5.4 EQUIPMENT FOR SURVEY

5.4.1 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.

5.4.2 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.

5.4.3 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.

5.4.4 Adequate and safe lighting is to be provided for the safe and efficient conduct of the survey.

5.4.5 Adequate protective clothing is to be made available and used (e.g. safety helmet, gloves, safety shoes, etc.) during the survey.
5.5 RESCUE AND EMERGENCY RESPONSE EQUIPMENT

5.5.1 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.

5.6 SURVEY AT SEA OR AT ANCHORAGE

5.6.1 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 5.1, 5.2, 5.3 and 5.4.

5.6.2 A communication system is to be arranged between the survey party in the spaces under examination and the responsible officer on deck. This system is to also include the personnel in charge of ballast pump handling if boats or rafts are used.

5.6.3 Surveys of tanks or applicable holds 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.

5.6.4 When rafts or boats are used for close-up surveys, 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, should be used;
  2. the boat or raft should be tethered to the access ladder and an additional person should be stationed down the access ladder with a clear view of the boat or raft;
  3. appropriate lifejackets should be available for all participants;
  4. the surface of water in the tank should be calm (under all foreseeable conditions the expected rise of water within the tank should not exceed 0.25 m) and the water level either stationary. On no account should 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 on the water is not acceptable;
  6. at no time should the water level 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 should only 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;

5.6.5 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.

5.6.6 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 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:
     i. access direct from the deck via a vertical ladder and a small platform fitted approximately 2 m below the deck in each bay; or
     ii. 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.

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

5.6.7 The use of rafts or boats alone in paragraphs 5.6.5 and 5.6.6 does not preclude the use of boats or rafts to move about within a tank during a survey.

NOTE: Reference is made to IACS Recommendation 39 – Guidelines for use of Boats or Rafts for Close-up Surveys.

5.7 SURVEY PLANNING MEETING

5.7.1 The establishment of 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.

5.7.2 Prior to commencement of any part of the renewal and intermediate survey, a survey planning meeting is to be held between the attending surveyor(s), the owner’s representative in attendance, 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 to ascertain that all the arrangements envisaged in the survey programme are in place, so as to ensure the safe and efficient conduct of the survey work to be carried out. See also 7.1.2.

5.7.3 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; and
.9 communication between attending surveyor(s) the thickness measurement firm operator(s) and owner representative(s) concerning findings.
6 DOCUMENTATION ON BOARD

6.1 GENERAL

6.1.1 The Owner is to obtain, supply and maintain on board documentation as specified in 6.2 and 6.3, which is to be readily available for the Surveyor.

6.1.2 The documentation is to be kept on board for the life time of the ship.

6.1.3 For ships defined in the Rules, Part - General requirements, Ch. 2 - Survey during construction and initial survey, under the note in 1.2.2.27 the following is to be applied to surveys commenced on or after 1st July 2016.

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.

6.2 SURVEY REPORT FILE

6.2.1 A Survey Report File is to be a part of the documentation on board consisting of:
- reports of structural surveys,
- Executive Hull Summary,
- thickness measurement reports.

6.2.2 The Survey Report File is to be available also in the Owner's and the Registers management offices.

6.3 SUPPORTING DOCUMENTS

6.3.1 The following additional documentation is to be available onboard:
- Survey Programme as required by 5.1 until such time as the Renewal Survey or Intermediate Survey, as applicable, has been completed.
- Main structural plans of cargo holds and Ballast Tanks (for CSR ships these plans are to include for each structural element both the as-built and renewal thickness. Any thickness for voluntary addition is also to be clearly indicated on the plans. The midship section plan to be supplied on board the ship is to include the minimum allowable hull girder sectional properties for hold transverse section in all cargo holds),
- previous repair history,
- cargo and ballast history,
- inspections by ship's personnel with reference to:
  - structural deterioration in general,
  - leakage in bulkheads and piping,
- condition of coating or corrosion prevention system, if any,
- a guidance for reporting is shown in Table III,
- any other information that will help identify critical structural areas and/or Suspect Areas requiring inspection.

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

6.4 REVIEW OF DOCUMENTATION ON BOARD

6.4.1 Prior to inspection, the Surveyor is to examine the completeness of the documentation onboard, and its contents as a basis for the survey.

6.4.2 For tankers and bulk carriers subject to SOLAS, Chapter II-1, Part A-1, Reg. 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.

6.4.2.1 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.

6.4.2.2 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.

6.4.3 For tankers and bulk carriers subject to SOLAS, Chapter II-1, Part A-1, Reg. 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.
7 PROCEDURES FOR THICKNESS MEASUREMENTS

7.1 GENERAL

7.1.1 The required thickness measurements, if not carried out by the Register itself, are to be witnessed by a Surveyor of the Register. The Surveyor is to be on board to the extent necessary to control the process.

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

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

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

7.2 CERTIFICATION OF THICKNESS MEASUREMENTS FIRM

7.2.1 The thickness measurements are to be carried out by a qualified firm certified by the Rules, Part 1 - General requirements, Ch. 4 - Approval of manufacturers and service suppliers.

7.3 NUMBER AND LOCATIONS OF MEASUREMENTS

7.3.1 Application

The item 7.3 only applies to vessels built under the IACS Common Structural Rules IACS Common Structural Rules* (CSR). For vessels not built under IACS Common Structural Rules, the requirements for number and locations of measurements are according to the Rules of the Register and/or specific IACS URs depending on ship’s age and structural elements concerned.

* IACS Common Structural Rules mean IACS Common Structural Rules for Bulk Carriers (IACS CSR for Bulk Carriers) or IACS Common Structural Rules for Bulk Carriers and Oil Tankers (IACS CSR BC & OT).

7.3.2 Number of measurements

Considering the extent of thickness measurements according to the different structural elements of the ship and surveys (Renewal, intermediate and annual), the locations of the points to be measured are given for the most important items of the structure.

7.3.3 Locations of measurements

Table 1 provides explanations and/or interpretations for the application of those requirements indicated in the Rules, which refer to both systematic thickness measurements related to the calculation of global hull girder strength and specific measurements connected to close-up surveys.

Table 4 to Table 9 are provided to facilitate the explanations and/or interpretations given in Table 1, to show typical arrangements of single side skin bulk carriers.

<table>
<thead>
<tr>
<th>Item</th>
<th>Interpretation</th>
<th>Figure reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selected plates on deck, tank top, bottom, double bottom and wind-and-water area</td>
<td>«Selected» means at least a single point on one out of three plates, to be chosen on representative areas of average corrosion</td>
<td></td>
</tr>
<tr>
<td>All deck, tank top and bottom plates and wind-and-water strakes</td>
<td>At least two points on each plate to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion</td>
<td></td>
</tr>
<tr>
<td>Transverse section</td>
<td>A transverse section includes all longitudinal members such as plating, longitudinals and girders at the deck, side, bottom; inner bottom and hopper side plating, longitudinal bulkhead and bottom plating in top wing tanks.</td>
<td>Fig 4</td>
</tr>
<tr>
<td>All cargo hold hatch covers and coamings</td>
<td>Including plates and stiffeners</td>
<td>Locations of points are given in Fig 5</td>
</tr>
<tr>
<td>Item</td>
<td>Interpretation</td>
<td>Figure reference</td>
</tr>
<tr>
<td>---------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Transverse section of deck plating outside line of cargo hatch openings</td>
<td>Two single points on each deck plate (to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion) between the ship sides and hatch coamings in the transverse section concerned</td>
<td></td>
</tr>
<tr>
<td>All deck plating and underdeck structure inside line of hatch openings between cargo hold hatches</td>
<td>«All deck plating» means at least two points on each plate to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion. «Under deck structure»: at each short longitudinal girder: three points for web plating (fwd/middle/aft), single point for face plate, one point for web plating and one point for face plating of transverse beam in way. At each ends of transverse beams, one point for web plating and one point for face plating.</td>
<td>Extent of areas is shown in Annex D</td>
</tr>
<tr>
<td>Selected side shell frames in cargo holds</td>
<td>Includes side shell frame, upper and lower end attachments and adjacent shell plating. 25% of frames: one out of four frames should preferably be chosen throughout the cargo hold length on each side. 50% of frames: one out of two frames should preferably be chosen throughout the cargo hold length on each side. «Selected frames» means at least 3 frames on each side of cargo holds</td>
<td>Extent of areas is shown in Annex D</td>
</tr>
<tr>
<td>Transverse bulkheads in cargo holds</td>
<td>Includes bulkhead plating, stiffeners and girders, including internal structure of upper and lower stools, where fitted. Two selected bulkheads: one is to be the bulkhead between the two foremost cargo holds and the second may be chosen in other positions</td>
<td>Areas of measurements are shown in Annex D</td>
</tr>
<tr>
<td>One transverse bulkhead in each cargo hold</td>
<td>This means that the close-up survey and related thickness measurements are to be performed on one side of the bulkhead; the side is to be chosen based on the outcome of the overall survey of both sides. In the event of doubt, the Surveyor may also require (possibly partial) close-up survey on the other side</td>
<td>Areas of measurements are shown in Annex D</td>
</tr>
<tr>
<td>Transverse bulkheads in one topside, hopper and double bottom ballast tank</td>
<td>Includes bulkhead and stiffening systems. The ballast tank is to be chosen based on the history of ballasting among those prone to have the most severe conditions</td>
<td>Locations of points are given in Fig 8</td>
</tr>
<tr>
<td>Item</td>
<td>Interpretation</td>
<td>Figure reference</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Transverse webs in ballast tanks</td>
<td>Includes web plating, face plates, stiffeners and associated plating and longitudinals. One of the representative tanks of each type (i.e. topside or hopper or side tank) is to be chosen in the forward part</td>
<td>Areas of measurements are shown in Annex D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Locations of points are given in Fig 6</td>
</tr>
</tbody>
</table>
NOTE: Measurements are to be taken on both port and starboard sides of the selected transverse section.

Figure 4 - Transverse section of a single skin bulk carrier

Figure 5 - Locations of measurements on hatch covers and coamings

NOTES:
1. Three sections at L/4, L/2, 3L/4 of hatch cover length, including:
   - one measurement of each hatch cover plate and skirt plate
   - measurements of adjacent beams and stiffeners
   - one measurement of coaming plates and coaming flange, each side
2. Measurements of both ends of hatch cover skirt plate, coaming plate and coaming flange
3. One measurement (two points for web plate and one point for face plate) of one out of three hatch coaming brackets and bars, on both sides and both ends
NOTE:
The gauging pattern for web plating is to be a three point pattern for zones A, C and D, and a two point pattern for zone B (see figure). The gauging report is to reflect the average reading. The average reading is to be compared with the allowable thickness. If the web plating has general corrosion, then this pattern is to be expanded to a five-point pattern.

Figure 6 - Locations of measurements on structural members in cargo holds and ballast tanks of single side skin bulk carriers

NOTE: Measurements to be taken in each shaded area as per views A - A and B - B

Figure 7 - Locations of measurements on cargo hold transverse bulkheads
(additional measurements to internal structure of upper and lower stools to be added, e.g. two points in the upper and two points in the lower stools to be indicated in section A - A)
NOTE: Measurements to be taken in each vertical section as per view A - A

Figure 8 - Locations of measurements on transverse bulkheads of topside, hopper and double bottom tanks (two additional measurements to internal structure of double bottom tank to be added at midspan)
7.4 REPORTING

7.4.1 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.

7.4.2 The Surveyor is to review the final thickness measurement report and countersign the cover page.
8 ACCEPTANCE CRITERIA

8.1 GENERAL

8.1.1 For vessels built under IACS Common Structural Rules, the Acceptance Criteria is according to IACS Common Structural Rules* (CSR) and as specified in 8.2, 8.3 and 8.4.

*Ch. 13 of IACS CSR for Bulk Carriers, or Ch. 13, Part 1 of IACS CSR BC & OT.

8.1.2 For vessels not built under IACS Common Structural Rules, the Acceptance Criteria are according to the Rules of the Register and/or specific IACS URs depending on ship’s age and structural elements concerned, e.g. UR S18 for corrugated transverse watertight bulkheads, UR S19 for the transverse watertight corrugated bulkhead between Cargo Holds Nos. 1 and 2, and UR S21 for all cargo hatch covers and hatch forward and side coamings on exposed decks in position 1 (as defined in ILLC), UR S31 for side shell frames, as applicable.

8.2 ACCEPTANCE CRITERIA FOR PITTING CORROSION OF CSR SHIPS

8.2.1 Side structures

If pitting intensity in an area where coating is required, according to IACS Common Structural Rules* (CSR), is higher than 15% (see Figure 1), thickness measurements are to be performed to check the extent of pitting corrosion. The 15% is based on pitting or grooving on only one side of a plate.

*Sec. 5, Ch. 3 of IACS CSR for Bulk Carriers, or Sec. 4, Ch. 3, Part 1 of IACS CSR BC & OT.

In cases where pitting is exceeding 15%, as defined above, an area of 300 mm or more, at the most pitted part of the plate, is to be cleaned to bare metal and the thickness is to be measured in way of the five deepest pits within the cleaned area. The least thickness measured in way of any of these pits is to be taken as the thickness to be recorded.

The minimum remaining thickness in pits, grooves or other local areas is to be greater than the following without being greater than the renewal thickness (tren):

- 75% of the as-built thickness, in the frame and end brackets webs and flanges
- 70% of the as-built thickness, in the side shell, hopper tank and topside tank plating attached to the each side frame, over a width up to 30 mm from each side of it.

8.2.2 Other structures

For plates with pitting intensity less than 20%, see Figure 1, the measured thickness, tm, of any individual measurement is to meet the lesser of the following criteria:

\[ t_m \geq 0.7 (t_{as-built} - t_{vol add}) \text{ mm} \]
\[ t_m \geq t_{ren} - 1 \text{ mm} \]

where:

- \( t_{as-built} \): As-built thickness of the member, in mm
- \( t_{vol add} \): Voluntary thickness addition; thickness, in mm, voluntarily added as the Owner’s extra margin for corrosion wastage in addition to \( t_C \)
- \( t_{ren} \): Renewal thickness; minimum allowable thickness, in mm, below which renewal of structural members is to be carried out
- \( t_C \): Total corrosion addition, in mm, defined in IACS Common Structural Rules* (CSR)
- \( t_m \): Measured thickness, in mm, on one item, i.e. average thickness on one item using the various measurements taken on this same item during periodical ship’s in service surveys.

*Sec. 3, Ch. 3 of IACS CSR for Bulk Carriers, or Sec. 3, Ch. 3, Part 1 of IACS CSR BC & OT.

The average thickness across any cross section in the plating is not to be less than the renewal criteria for general corrosion given in IACS Common Structural Rules*.

*Ch. 13 of IACS CSR for Bulk Carriers, or Ch. 13, Part 1 of IACS CSR BC & OT.

8.3 ACCEPTANCE CRITERIA FOR EDGE CORROSION OF CSR SHIPS

8.3.1 Provided that the overall corroded height of the edge corrosion of the flange, or web in the case of flat bar stiffeners, is less than 25%, see Figure 2, of the stiffener flange breadth or web height, as applicable, the measured thickness, \( t_m \), is to meet the lesser of the following criteria:

\[ t_m \geq 0.7 (t_{as-built} - t_{vol add}) \text{ mm} \]
\[ t_m \geq t_{ren} - 1 \text{ mm} \]

8.3.2 The average measured thickness across the breadth or height of the stiffener is not to be less than that defined in IACS Common Structural Rules* (CSR).

*Ch. 13 of IACS CSR for Bulk Carriers, or Ch. 13, Part 1 of IACS CSR BC & OT.

8.3.3 Plate edges at openings for manholes, lightening holes etc. may be below the minimum thickness given in IACS Common Structural Rules* (CSR) provided that:

a) the maximum extent of the reduced plate thickness, below the minimum given in IACS Common Structural Rules* (CSR), from the opening edge is not more than 20% of the smallest dimension of the opening and does not exceed 100mm.

b) rough or uneven edges may be cropped-back provided that the maximum dimension of the opening is not increased by more than 10% and the remaining thickness of the new edge is not less than \( t_{ren} - 1 \text{ mm} \).

*Ch. 13 of IACS CSR for Bulk Carriers, or Ch. 13, Part 1 of IACS CSR BC & OT.
8.4 ACCEPTANCE CRITERIA FOR GROOVING CORROSION OF CSR SHIPS

8.4.1 Where the groove breadth is a maximum of 15% of the web height, but not more than 30 mm, see Figure 3, the measured thickness, $t_m$, in the grooved area is to meet the lesser of the following criteria:

\[
\begin{align*}
    t_m &\geq 0.75 \left( t_{as\text{-}built} - t_{vol\text{-}add} \right) \text{ mm} \\
    t_m &\geq t_{ren} - 0.5 \text{ mm}
\end{align*}
\]

but is not to be less than:

\[ t_m = 6 \text{ mm} \]

8.4.2 Structural members with areas of grooving greater than those in 8.4.1 above are to be assessed based on the criteria for general corrosion as defined in IACS Common Structural Rules* (CSR) using the average measured thickness across the plating/stiffener.

* Ch.13 of IACS CSR for Bulk Carriers, or Ch. 13, Part 1 of IACS CSR BC & OT.
9 REPORTING AND EVALUATION OF SURVEY

9.1 EVALUATION OF SURVEY REPORT

9.1.1 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.

9.1.1.1 For CSR bulk carriers, the ship’s longitudinal strength is to be evaluated by using the thickness of structural members measured, renewed and reinforced, as appropriate, during the Renewal surveys carried out after the ship reached 15 years of age (or during the Renewal survey no. 3, if this is carried out before the ship reaches 15 years) in accordance with the criteria for longitudinal strength of the ship’s hull girder for CSR bulk carriers specified in IACS Common Structural Rules* (CSR).

* Ch.13 of IACS CSR for Bulk Carriers, or Ch. 13, Part 1 of IACS CSR BC & OT.

9.1.1.2 The final result of evaluation of the ship’s longitudinal strength required in 9.1.1.1, after renewal or reinforcement work of structural members, if carried out as a result of initial evaluation, is to be reported as a part of the Executive Hull Summary.

9.2 REPORTING

9.2.1 Principles for survey reporting are shown in the Annex II of IACS UR Z10.2.

9.2.2 When a survey is split between different survey stations, a report is to be made for each portion of the survey. A list of item 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.

9.2.3 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 the Head Office of the Register.

<table>
<thead>
<tr>
<th>Table I</th>
</tr>
</thead>
<tbody>
<tr>
<td>TABLE OF MINIMUM REQUIREMENT FOR CLOSE-UP SURVEY AT RENEWAL HULL SURVEYS OF BULK CARRIERS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I Renewal survey (age ≤ 5)</th>
<th>II Renewal survey (5 &lt; age ≤ 10)</th>
<th>III Renewal survey (10 &lt; age ≤ 15)</th>
<th>IV Renewal survey and all subsequent surveys (age &gt; 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) 25 % of shell frames in the forward cargo hold at representative positions.</td>
<td>(A) All shall 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 shall 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.</td>
<td>(A) All shell frames in the forward and one other selected cargo hold and 50% of frames in remaining cargo holds, including upper and lower end attachments and adjacent shell plating. Areas (B) - (E) as for Renewal survey No. III</td>
<td>(A) All frames in all cargo holds, including upper and lower end attachments and adjacent shell plating.</td>
</tr>
<tr>
<td>(A) Selected frames in remaining cargo holds.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(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).</td>
<td>(B) One transverse web with associated plating and longitudinals in each water ballast tank.</td>
<td>(B) Forward and aft transverse bulkhead in one ballast tank, including stiffening system.</td>
<td>(B) All transverse webs with associated plating and longitudinals in each water ballast tank.</td>
</tr>
<tr>
<td></td>
<td>(B) All transverse bulkheads in ballast tanks, including stiffening system.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### RULES FOR THE CLASSIFICATION OF SHIPS

#### PART 1 – CHAPTER 5 - Annex C1

| I Renewal survey  
| (age ≤ 5) | II Renewal survey  
| (5 < age ≤ 10) | III Renewal survey  
| (10 < age ≤ 15) | IV Renewal survey and all subsequent surveys  
| (age > 15) |
|---|---|---|---|
| (C) Two selected cargo hold transverse bulkheads, 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. | Areas (C), (D) and (E) as for Renewal survey No. II |
| (D) All cargo hold hatch covers and coamings (plating and stiffeners) | (D) All cargo hold hatch covers and coamings (plating and stiffeners) | |
| Cargo hold transverse frames: | Cargo hold transverse frames: | Cargo hold transverse frames: |
| (A): Transverse web frame or watertight transverse bulkhead in water ballast tanks | (B): Cargo hold transverse bulkheads plating, stiffeners and girders | (C): 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 shall be done of accessible parts of hatch covers structures. |
| (D): Deck plating and under deck structure inside line of hatch openings between cargo hold hatches | See sketches in Annex D for areas corresponding to (A), (B), (C), (D) and (E) | Zones of side shell frames for ships are as required for compliance with UR S31 |
| NOTES: | NOTES: | NOTES: |
| Close-up survey of transverse bulkheads is to be carried out at four levels: | Close-up survey of transverse bulkheads is to be carried out at four levels: | Close-up survey of transverse bulkheads is 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 stool | Level (a) – immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without stool | Level (a) – immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without stool |
| Level (b) – immediately above and below the lower stool shell plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates | Level (b) – immediately above and below the lower stool shell plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates | Level (b) – immediately above and below the lower stool shell 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 (c) – about mid-height of the bulkhead | 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 | 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 | 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 II
MINIMUM REQUIREMENTS FOR THICKNESS MEASUREMENTS AT RENEWAL HULL SURVEY OF BULK CARRIERS

| I Renewal survey  
(age ≤ 5) | II Renewal survey  
(5 < age ≤ 10) | III Renewal survey  
(10 < age ≤ 15) | IV Renewal survey and all subsequent surveys  
(age > 15) |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Suspect areas.</td>
<td>1. Suspect areas.</td>
<td>1. Suspect areas.</td>
<td>1. Suspect areas.</td>
</tr>
<tr>
<td>2. Within the cargo length:</td>
<td>2. Within the cargo length:</td>
<td>2. Within the cargo length:</td>
<td>2. Within the cargo length:</td>
</tr>
<tr>
<td>a) two transverse sections of deck plating outside line of cargo hatch openings</td>
<td>a) each deck plate outside line of cargo hatch openings,</td>
<td>a) each deck plate outside line of cargo hatch openings,</td>
<td>a) each deck plate outside line of cargo hatch openings,</td>
</tr>
<tr>
<td>b) two transverse sections, one in the amidship area outside line of cargo hatch opening;</td>
<td>b) two transverse sections, one in the amidship area outside line of cargo hatch opening;</td>
<td>b) three transverse sections, one in the amidship area outside line of cargo hatch opening;</td>
<td>b) three transverse sections, one in the amidship area outside line of cargo hatch opening;</td>
</tr>
<tr>
<td>c) all wind and water strakes</td>
<td>c) all wind and water strakes</td>
<td>c) each bottom plate.</td>
<td>c) each bottom plate.</td>
</tr>
<tr>
<td>3. Wind and water strakes in way of the transverse sections considered above. Selected wind and water strakes outside the cargo length area.</td>
<td>3. Selected wind and water strakes outside the cargo length area</td>
<td>3. All wind and water strakes, full length</td>
<td>3. All wind and water strakes, full length</td>
</tr>
<tr>
<td>4. Measurement, for general assessment and recording of corrosion pattern, of those structural members, subject to Close-up survey according to Table I.</td>
<td>4. Measurement, for general assessment and recording of corrosion pattern, of those structural members, subject to Close-up survey according to Table I.</td>
<td>4. Measurement, for general assessment and recording of corrosion pattern, of those structural members, subject to Close-up survey according to Table I.</td>
<td>4. Measurement, for general assessment and recording of corrosion pattern, of those structural members, subject to Close-up survey according to Table I.</td>
</tr>
<tr>
<td>5. Additional thickness measurement guidelines applicable to the side shell frames and brackets on ships subject to compliance with UR S31.</td>
<td>5. Additional thickness measurement guidelines applicable to the vertically corrugated transverse watertight bulkhead between cargo hold Nos. 1 and 2 on ships subject to compliance with UR S19 and S23. Guidance is contained in the Rules, Part 2 – Hull, Annex A.</td>
<td>5. Additional thickness measurement guidelines applicable to the vertically corrugated transverse watertight bulkhead between cargo hold Nos. 1 and 2 on ships subject to compliance with UR S19 and S23. Guidance is contained in the Rules, Part 2 – Hull, Annex A.</td>
<td>5. Additional thickness measurement guidelines applicable to the vertically corrugated transverse watertight bulkhead between cargo hold Nos. 1 and 2 on ships subject to compliance with UR S19 and S23. Guidance is contained in the Rules, Part 2 – Hull, Annex A.</td>
</tr>
<tr>
<td>6. Additional thickness measurement guidelines applicable to the side shell frames and brackets on ships subject to compliance with UR S31.</td>
<td>6. Additional thickness measurement guidelines applicable to the side shell frames and brackets on ships subject to compliance with UR S31.</td>
<td>6. Additional thickness measurement guidelines applicable to the side shell frames and brackets on ships subject to compliance with UR S31.</td>
<td>6. Additional thickness measurement guidelines applicable to the side shell frames and brackets on ships subject to compliance with UR S31.</td>
</tr>
</tbody>
</table>
**Table III, Sheet 1**  
**REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENT AT THOSE AREAS OF SUBSTANTIAL CORROSION**  
**RENEWAL SURVEY OF BULK CARRIERS WITHIN THE CARGO AREA**  

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom and side shell plating</td>
<td>a) Suspect plate, plus 4 adjacent plates</td>
<td>a) 5 point pattern for each panel between longitudinals</td>
</tr>
<tr>
<td></td>
<td>b) See other tables for particulars on gauging in way tanks and cargo holds</td>
<td></td>
</tr>
<tr>
<td>Bottom / side shell longitudinals</td>
<td>Minimum of 3 longitudinals in way of suspect areas</td>
<td>3 measurements in line across web</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 measurements on flange</td>
</tr>
</tbody>
</table>

**Table III, Sheet 2**  
**REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENT AT THOSE AREAS OF SUBSTANTIAL CORROSION**  
**RENEWAL SURVEY OF BULK CARRIERS WITHIN THE CARGO AREA**  

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower stool</td>
<td>a) Transverse band within 25 [mm] of welded connection to inner bottom</td>
<td>a) 5 point between stiffeners over 1 metre length</td>
</tr>
<tr>
<td></td>
<td>b) Transverse band within 25 [mm] of welded connection to shelf plate</td>
<td>b) Ditto</td>
</tr>
<tr>
<td>Transverse bulkhead</td>
<td>a) Transverse band at approximately mid height</td>
<td>a) 5 point pattern over 1 square meter of plating</td>
</tr>
<tr>
<td></td>
<td>b) Transverse band at part of bulkhead adjacent to upper deck or below upper stool shelf plate (for those ships fitted with upper stools)</td>
<td>b) 5 point pattern over 1 square meter of plating</td>
</tr>
</tbody>
</table>

**Table III, Sheet 3**  
**REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENT AT THOSE AREAS OF SUBSTANTIAL CORROSION**  
**RENEWAL SURVEY OF BULK CARRIERS WITHIN THE CARGO AREA**  

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross deck strip plating</td>
<td>Suspect cross deck strip plating</td>
<td>a) 5 point pattern between underdeck stiffeners over 1 metre length</td>
</tr>
<tr>
<td>Underdeck stiffeners</td>
<td>a) Transverse members</td>
<td>a) 5 point pattern at each end and mid span</td>
</tr>
<tr>
<td></td>
<td>b) Longitudinal members</td>
<td>b) 5 point pattern on both web and flange</td>
</tr>
<tr>
<td>Hatch covers</td>
<td>a) Side and end skirts, each 3 locations</td>
<td>a) 5 point pattern at each location</td>
</tr>
<tr>
<td></td>
<td>b) 3 longitudinal bands, outboard strakes (2) and centreline strake (1)</td>
<td>b) 5 point measurement each band</td>
</tr>
<tr>
<td>Hatch coamings</td>
<td>Each side and end coaming, one band lower 1/3, one band upper 2/3 of coaming</td>
<td>5 point measurement each band i.e. end or side coaming</td>
</tr>
</tbody>
</table>
### DECK STRUCTURE INCLUDING CROSS STRIPS, MAIN CARGO HATCHWAYS, HATCH COVERS, COAMINGS AND TOPSIDE TANKS

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Topside water ballast tanks</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Watertight transverse bulkheads:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- lower 1/3 of bulkhead</td>
<td>a) Watertight transverse bulkheads:</td>
<td></td>
</tr>
<tr>
<td>- upper 2/3 of bulkhead</td>
<td>- 5 point pattern over 1 square metre of plating</td>
<td></td>
</tr>
<tr>
<td>- stiffeners</td>
<td>- 5 point pattern over 1 square metre of plating</td>
<td></td>
</tr>
<tr>
<td>b) 2 representative swash transverse bulkheads:</td>
<td>b) 2 representative swash transverse bulkheads:</td>
<td></td>
</tr>
<tr>
<td>- lower 1/3 of bulkhead</td>
<td>- 5 point pattern over 1 square metre of plating</td>
<td></td>
</tr>
<tr>
<td>- upper 2/3 of bulkhead</td>
<td>- 5 point pattern over 1 square metre of plating</td>
<td></td>
</tr>
<tr>
<td>- stiffeners</td>
<td>- 5 point pattern over 1 metre of length</td>
<td></td>
</tr>
<tr>
<td>c) 3 representative bays of slope plating:</td>
<td>c) 3 representative bays of slope plating:</td>
<td></td>
</tr>
<tr>
<td>- lower 1/3 of tank</td>
<td>- 5 point pattern over 1 square metre of plating</td>
<td></td>
</tr>
<tr>
<td>- upper 2/3 of tank</td>
<td>- 5 point pattern over 1 square metre of plating</td>
<td></td>
</tr>
<tr>
<td>d) Longitudinals, suspect and adjacent</td>
<td>d) 5 point pattern both web and flange over 1 metre length.</td>
<td></td>
</tr>
<tr>
<td><strong>Main deck plating</strong></td>
<td>Suspect plates and adjacent (4)</td>
<td>5 point pattern over 1 square metre of plating</td>
</tr>
<tr>
<td><strong>Main deck longitudinals</strong></td>
<td>Minimum of 3 longitudinals where plating measured</td>
<td>5 point pattern on both web and flange over 1 metre length</td>
</tr>
<tr>
<td><strong>Web Frames / transverses</strong></td>
<td>Suspect plates</td>
<td>5 point pattern over 1 square metre</td>
</tr>
</tbody>
</table>

### REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENT AT THOSE AREAS OF SUBSTANTIAL CORROSION RENEWAL SURVEY OF BULK CARRIERS WITHIN THE CARGO AREA

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner / double bottom plating</td>
<td>Suspect plate plus all adjacent plates</td>
<td>5 point pattern for each panel between longitudinals over 1 metre length</td>
</tr>
<tr>
<td>Inner / double bottom longitudinals</td>
<td>Three longitudinals where plates measured</td>
<td>+ 3 measurements in line across web and 3 measurements on flange</td>
</tr>
<tr>
<td><strong>Longitudinal Girders or Transverse Floors</strong></td>
<td>Suspect plates</td>
<td>5 point pattern over about 1 square metre</td>
</tr>
<tr>
<td><strong>Watertight bulkheads (watertight floors)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Lower 1/3 of tank</td>
<td>a) 5 point pattern over 1 square metre of plating</td>
<td></td>
</tr>
<tr>
<td>b) Upper 2/3 of tank</td>
<td>b) 5 point pattern alternate plates over 1 square metre of plating</td>
<td></td>
</tr>
</tbody>
</table>
### DOUBLE BOTTOM AND HOPPER STRUCTURE

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web frames</td>
<td>Suspect plate</td>
<td>5 point pattern over 1 square metre of plating</td>
</tr>
<tr>
<td>Bottom/side shell longitudinals</td>
<td>Minimum of 3 longitudinals in way of suspect areas.</td>
<td>3 measurements in line across web 3 measurements on flange</td>
</tr>
</tbody>
</table>

### REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENT AT THOSE AREAS OF SUBSTANTIAL CORROSION RENEWAL SURVEY OF BULK CARRIERS WITHIN THE CARGO AREA

### CARGO HOLDS

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
</table>
| Side shell frames     | Suspect frame and each adjacent | a) At each end and mid span: 5 point pattern of both web and flange  
|                       |                             | b) 5 point pattern within 25 [mm] of welded attachment to both shell and lower slope plate |
ANNEX C
Hull Surveys of Double Skin Bulk Carriers
# Annex C

## HULL SURVEYS OF DOUBLE SKIN BULK CARRIERS

### Contents:

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. GENERAL</td>
<td>1</td>
</tr>
<tr>
<td>1.1 APPLICATION</td>
<td>1</td>
</tr>
<tr>
<td>1.2 DEFINITIONS</td>
<td>1</td>
</tr>
<tr>
<td>1.3 REPAIRS</td>
<td>4</td>
</tr>
<tr>
<td>1.4 THICKNESS MEASUREMENTS AND CLOSE-UP SURVEYS</td>
<td>4</td>
</tr>
<tr>
<td>2. RENEWAL (SPECIAL) SURVEY</td>
<td>5</td>
</tr>
<tr>
<td>2.1 SCHEDULE</td>
<td>5</td>
</tr>
<tr>
<td>2.2 SCOPE</td>
<td>5</td>
</tr>
<tr>
<td>2.3 EXTENT OF OVERALL AND CLOSE-UP SURVEYS</td>
<td>6</td>
</tr>
<tr>
<td>2.4 EXTENT OF THICKNESS MEASUREMENTS</td>
<td>6</td>
</tr>
<tr>
<td>2.5 EXTENT OF TANK TESTING</td>
<td>7</td>
</tr>
<tr>
<td>2.6 ADDITIONAL RENEWAL SURVEY REQUIREMENTS AFTER DETERMINING COMPLIANCE WITH SOLAS XII/12 AND XII/13</td>
<td>7</td>
</tr>
<tr>
<td>3. ANNUAL SURVEY</td>
<td>8</td>
</tr>
<tr>
<td>3.1 SCHEDULE</td>
<td>8</td>
</tr>
<tr>
<td>3.2 SCOPE</td>
<td>8</td>
</tr>
<tr>
<td>3.3 ADDITIONAL ANNUAL SURVEY REQUIREMENTS AFTER DETERMINING COMPLIANCE WITH SOLAS XII/12 AND XII/13</td>
<td>9</td>
</tr>
<tr>
<td>4. INTERMEDIATE SURVEY</td>
<td>10</td>
</tr>
<tr>
<td>4.1 SCHEDULE</td>
<td>10</td>
</tr>
<tr>
<td>4.2 SCOPE</td>
<td>10</td>
</tr>
<tr>
<td>5. PREPARATION FOR SURVEY</td>
<td>12</td>
</tr>
<tr>
<td>5.1 SURVEY PROGRAMME</td>
<td>12</td>
</tr>
<tr>
<td>5.2 CONDITIONS FOR SURVEY</td>
<td>13</td>
</tr>
<tr>
<td>5.3 ACCESS TO STRUCTURES</td>
<td>13</td>
</tr>
<tr>
<td>5.4 EQUIPMENT FOR SURVEY</td>
<td>13</td>
</tr>
<tr>
<td>5.5 RESCUE AND EMERGENCY RESPONSE EQUIPMENT</td>
<td>13</td>
</tr>
<tr>
<td>5.6 SURVEY AT SEA OR AT ANCHORAGE</td>
<td>13</td>
</tr>
<tr>
<td>5.7 SURVEY PLANNING MEETING</td>
<td>14</td>
</tr>
<tr>
<td>6. DOCUMENTATION ON BOARD</td>
<td>15</td>
</tr>
<tr>
<td>6.1 GENERAL</td>
<td>15</td>
</tr>
<tr>
<td>6.2 SURVEY REPORT FILE</td>
<td>15</td>
</tr>
<tr>
<td>6.3 SUPPORTING DOCUMENTS</td>
<td>15</td>
</tr>
<tr>
<td>6.4 REVIEW OF DOCUMENTATION ON BOARD</td>
<td>15</td>
</tr>
<tr>
<td>7. PROCEDURES FOR THICKNESS MEASUREMENTS</td>
<td>16</td>
</tr>
<tr>
<td>7.1 GENERAL</td>
<td>16</td>
</tr>
<tr>
<td>7.2 CERTIFICATION OF THICKNESS MEASUREMENTS FIRM</td>
<td>16</td>
</tr>
<tr>
<td>7.3 NUMBER AND LOCATIONS OF MEASUREMENTS</td>
<td>16</td>
</tr>
<tr>
<td>7.4 REPORTING</td>
<td>20</td>
</tr>
<tr>
<td>8. ACCEPTANCE CRITERIA</td>
<td>21</td>
</tr>
<tr>
<td>8.1 GENERAL</td>
<td>21</td>
</tr>
<tr>
<td>8.2 ACCEPTANCE CRITERIA FOR PITTING CORROSION OF CSR SHIPS</td>
<td>21</td>
</tr>
<tr>
<td>8.3 ACCEPTANCE CRITERIA FOR EDGE CORROSION OF CSR SHIPS</td>
<td>21</td>
</tr>
<tr>
<td>8.4 ACCEPTANCE CRITERIA FOR GROOVING CORROSION OF CSR SHIPS</td>
<td>22</td>
</tr>
<tr>
<td>9. REPORTING AND EVALUATION OF SURVEY</td>
<td>23</td>
</tr>
<tr>
<td>9.1 EVALUATION OF SURVEY REPORT</td>
<td>23</td>
</tr>
<tr>
<td>9.2 REPORTING</td>
<td>23</td>
</tr>
</tbody>
</table>
1 GENERAL

1.1 APPLICATION

1.1.1 The requirements apply to all self-propelled Double Skin Bulk Carriers.

1.1.2 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 for single skin bulk carrier are to apply to cargo holds of single side skin.

1.1.3 The requirements apply to surveys of hull structure and piping systems in way of cargo holds, cofferdams, pipe tunnels, void spaces within the cargo length area and all ballast tanks. The requirements are additional to the classification requirements applicable to the remainder of the ship. Refer to subtitles 4.2, 5.2 and 7.2 in the Rules, Part 1 - General requirements, Ch. 5 - Surveys of ships in service.

1.1.4 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.

1.2 DEFINITIONS

1.2.1 Double Skin Bulk Carrier

A Double Skin Bulk Carrier is a ship which is constructed with a single deck, double bottom 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 1) in which all cargo holds are bounded by a double-side skin (regardless of the width of the wing space). Ore and combination carriers are not covered by the IACS Common Structural Rules.

1.2.2 Ballast Tank

A Ballast Tank is a tank which is used solely for salt water ballast, or, where applicable, a space which is used for both cargo and salt water 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.

1.2.3 Spaces

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

1.2.4 Overall Survey

An Overall Survey is a survey intended to report on the overall condition of the hull structure and determine the extent of additional close-up surveys.

1.2.5 Close-up Survey

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 reach of hand.

1.2.6 Transverse Section

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

1.2.7 Representative Spaces

Representative Spaces are those which are expected to reflect the condition of other spaces of similar type and service and with similar corrosion prevention systems. When selecting Representative Spaces account is to be taken of the service and repair history onboard and identifiable Critical Structural Areas and/or Suspect Areas.

1.2.8 Suspect Areas

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

1.2.9 Critical Structural Areas

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.

1.2.10 Renewal Thickness

Renewal thickness \( t_{\text{net}} \) is the minimum allowable thickness, in mm, below which renewal of structural members is to be carried out.

1.2.11 Substantial Corrosion

Substantial Corrosion is an extent of corrosion such that assessment of corrosion pattern, indicate 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 \( t_{\text{net}} + 0.5 \text{mm} \) and \( t_{\text{net}} \).

1.2.12 Corrosion Prevention System

A Corrosion Prevention System is normally considered a full hard 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 accepta-

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1) For combination carriers with longitudinal bulkheads additional requirements are specified in UR Z10.1 or UR Z10.4, as applicable.
1.2.13 Coating condition

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.

1.2.14 Cargo Length Area

Cargo Length Area is that part of the ship which contains all cargo holds and adjacent areas including fuel tanks, cofferdams, ballast tanks and void spaces.

1.2.15 Special consideration

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.

1.2.16 Prompt and Thorough Repair

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 classification, or recommendation.

1.2.17 Pitting Corrosion

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 1.

1.2.18 Edge Corrosion

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 2.

1.2.19 Grooving Corrosion

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.

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**Figure 1 - Pitting intensity diagrams**

- 5% SCATTERED
- 10% SCATTERED
- 15% SCATTERED
- 20% SCATTERED
- 25% SCATTERED
Figure 2 - Edge corrosion

Figure 3 - Grooving corrosion
1.3 REPAIRS

1.3.1 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 weather tight integrity, is to be promptly and thoroughly (see 1.2.15) repaired.

Areas to be considered include:
- bottom structure and bottom plating;
- side structure and side plating;
- deck structure and deck plating;
- inner bottom structure and inner bottom plating;
- inner side structure and inner side plating
- watertight or oiltight bulkheads;
- hatch covers and hatch coamings;
- items in 3.2.3.6.

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.

1.3.2 Additionally, when a survey results in the identification of structural defects or corrosion, 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.

1.3.3 Where the damage found on structure mentioned in item 1.3.1 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 weather tight integrity and impose a Recommendation / Condition of Class in accordance with IACS PR 35, with a specific time limit.

1.4 THICKNESS MEASUREMENTS AND CLOSE-UP SURVEYS

1.4.1 In any kind of survey, i.e. Renewal, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by Table II, of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.
2 RENEWAL (SPECIAL) SURVEY

2.1 SCHEDULE

2.1.1 Renewal surveys are to be carried out at 5 years intervals to renew the Certificate of Class.

2.1.2 The first Renewal survey is to be completed within 5 years from the date of the initial survey and thereafter within 5 years from the credited date of the previous Renewal 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 Renewal survey before the extension was granted.

2.1.3 For surveys completed within 3 months before the expiry date of the Renewal survey, the next period of validity of certificate will start from the expiry date of the Renewal survey. For surveys completed more than 3 months before the expiry date of the Renewal survey, the period of validity of certificate 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 the overdue surveys, the next period of class will start from the expiry date of the Renewal survey. If the owner elects to carry out the next due Renewal survey, the period of class will start from the survey completion date.

2.1.4 The Renewal survey may be commenced at the 4th annual survey and be progressed with a view to completion by the 5th anniversary date. When the Renewal 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 Renewal survey.

2.1.5 Concurrent crediting to both Intermediate survey and Renewal survey for surveys and thickness measurements of spaces are not acceptable.

2.2 SCOPE

2.2.1 General

2.2.1.1 The Renewal 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 2.2.1.3, 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.

2.2.1.2 All cargo holds, ballast tanks, including double bottom and double side 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 2.4 and 2.5, 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.

2.2.1.3 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.

2.2.1.4 The survey extent of ballast tanks converted to void spaces is to be specially considered in relation to the requirements for ballast tanks.

2.2.2 Dry Dock Survey

2.2.2.1 A survey in dry dock is to be a part of the Renewal 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 Renewal 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.

2.2.3 Tank Protection

2.2.3.1 Where provided, the condition of the corrosion prevention system of ballast tanks is to be examined. For ballast tanks, excluding double bottom tanks, where the protective coating is found in POOR condition, and it is not renewed, where soft or semi-hard coating has been applied, or where a 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 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 the 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.

2.2.3.2 Where a hard protective coating is provided in cargo holds and is found in GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered.

2.2.4 Hatch Covers and Coamings

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

2.2.4.1 A thorough inspection of the items listed in 3.2.3 is to be carried out, in addition to all hatch covers and coamings.

2.2.4.2 Checking of the satisfactory operation of all mechanically operated hatch covers is to be made, including:

1. stowage and securing in open condition;
2. proper fit and efficiency of sealing in closed condition;
3. operational testing of hydraulic and power components, wires, chains, and link drives.
2.2.4.3 Checking the effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent.

2.2.4.4 Close-up survey and thickness measurement of the hatch cover and coaming plating and stiffeners is to be carried out as given in Table I and Table II. 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.

2.3 EXTENT OF OVERALL AND CLOSE-UP SURVEYS

2.3.1 An overall survey of all tanks and spaces is to be carried out at each Renewal survey. Fuel oil tanks in the cargo length area are to be surveyed as follows:

<table>
<thead>
<tr>
<th>I Renewal survey (age ≤ 5)</th>
<th>II Renewal survey (5 &lt; age ≤ 10)</th>
<th>III Renewal survey (10 &lt; age ≤ 15)</th>
<th>IV Renewal survey and subsequent (age &gt; 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>One</td>
<td>Two</td>
<td>Half, minimum Two</td>
</tr>
</tbody>
</table>

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 Renewal survey, on a rotational basis.
3. Peak tanks (all uses) are subject to internal examination at each Renewal survey.
4. At Renewal survey no 3 and subsequent surveys, one deep tank for fuel oil in the cargo area is to be included if fitted.

2.3.2 The minimum requirements for close-up surveys at Renewal surveys are given in Table I/Sheet 1 for double skin bulk carriers, excluding ore carriers and in Table I/Sheet 2 for ore carriers, respectively.

2.3.3 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.

2.3.4 For areas in spaces where coatings are found to be in a GOOD condition, the extent of close-up surveys according to Table I may be specially considered by the Register, refer also to 2.2.3.2.

2.4 EXTENT OF THICKNESS MEASUREMENTS

2.4.1 The minimum requirements for thickness measurements at Renewal surveys are given in Table II.

2.4.2 Provisions for extended measurements for areas with Substantial Corrosion are given in Table III and as may be additionally specified in the Survey Programme as required by 5.1. 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.

2.4.3 The Surveyor may further extend the thickness measurements as deemed necessary.

2.4.4 For areas in tanks where hard protective coatings are found to be in a GOOD condition, the extent of thickness measurements according to Table II may be specially considered. Refer also to 2.2.3.2.

2.4.5 Transverse sections are to be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements, one of which is to be in the amidships area.

2.4.6 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 car-
ried 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.

2.5 EXTENT OF TANK TESTING

2.5.1 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.

2.5.2 The Surveyor may extend the tank testing as deemed necessary.

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

2.5.4 Boundaries of ballast holds are to be tested with a head of liquid to near to the top of hatches.

2.5.5 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.

2.5.6 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 tank top is carried out.

2.6 ADDITIONAL RENEWAL SURVEY REQUIREMENTS AFTER DETERMINING COMPLIANCE WITH SOLAS XII/12 AND XII/13

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

2.6.2 For ships complying with the requirements of SOLAS XII/13 for the availability of pumping systems, the Renewal 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.
3  ANNUAL SURVEY

3.1  SCHEDULE

3.1.1 Annual Surveys are to be held within 3 months before or after the anniversary date from the date of the initial classification survey or of the date credited for the last Renewal survey.

3.2  SCOPE

3.2.1 General

3.2.1.1 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.

3.2.2 Examination of the hull

3.2.2.1 Examination of the hull plating and its closing appliances as far as can be seen.

3.2.2.2 Examination of watertight penetrations as far as practicable.

3.2.3 Examination of weather decks, hatch covers and coamings

3.2.3.1 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.

3.2.3.2 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 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.

3.2.3.3 If there are indications of difficulty in operating and securing hatch covers, additional sets above those required by 3.2.3.2, at the discretion of the surveyor, are to be tested in operation.

3.2.3.4 Where the cargo hatch securing system does not function properly, repairs are to be carried out under the supervision of the Register. Where hatch covers or coamings undergo substantial repairs, the strength of securing devices should be upgraded to comply with S21.5 of UR S21.

3.2.3.5 For each cargo hatch cover set, at each annual survey, the following items are to be surveyed:

1. cover panels, including side plates, and stiffeners 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.

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

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

3.2.3.8 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, 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).

3.2.3.9 Examination of flame screens on vents to all bunker tanks.

3.2.3.10 Examination of bunker and vent piping systems, including ventilators.
3.2.4 Examination of Cargo Holds

3.2.4.1 Double Skin Bulk Carriers 10 to 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 measurement is 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 III. These extended thickness measurements are to be carried out before the survey is credited as complete. Suspect Areas identified at previous Renewal 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.

3.2.4.2 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 III. These extended thickness measurements are to be carried out before the survey is credited as complete. Suspect Areas identified at previous Renewal 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.

3.2.5 Examination of ballast tanks

3.2.5.1 Examination of ballast tanks when required as a consequence of the results of the Renewal 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, the extent of thickness measurements is to be increased in accordance with Table III. These extended thickness measurements are to be carried out before the survey is credited as complete. Suspect Areas identified at previous Renewal 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.

3.3 ADDITIONAL ANNUAL SURVEY REQUIREMENTS AFTER DETERMINING COMPLIANCE WITH SOLAS XII/12 AND XII/13

3.3.1 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.

3.3.2 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.
4 INTERMEDIATE SURVEY

4.1 SCHEDULE

4.1.1 The Intermediate Survey is to be held at or between either the 2nd or 3rd annual survey.

4.1.2 Those items, which are additional to the requirements of the annual survey, may be surveyed either at or between the 2nd and 3rd annual survey.

4.1.3 Concurrent crediting to both Intermediate survey and Renewal survey for surveys and thickness measurements of spaces are not acceptable.

4.2 SCOPE

4.2.1 General

4.2.1.1 The survey extent is dependent on the age of the vessel as specified in 4.2.2 to 4.2.4 and shown in Table IV.

4.2.2 Double Skin Bulk Carriers 5 - 10 years of age

The following is to apply:

4.2.2.1 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 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 protective coating is found in POOR condition, and it is not renewed, or where soft or semi-hard coating has been applied, or where a 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 coating is found in ballast double bottom tanks, or where a soft or semi-hard coating has been applied, or where a 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.

4.2.2.2 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 4.2.2.2a, 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.

4.2.2.3 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 4.2.2.2 b), and as provided in 4.2.2.1 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.

c) Where Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with the requirements of Table III. 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:

- protected by coating applied in accordance with the coating manufacturer’s requirements and examined at annual intervals to confirm the coating is still in good condition, or alternatively;

- required to be measured at annual intervals.

d) Where the hard protective coating in cargo holds is found to be in GOOD condition, 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 re-coat 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.
4.2.3 Double Skin Bulk Carriers 10 – 15 years of age

The following is to apply:

4.2.3.1 The requirements of the intermediate survey are to be to the same extent as the previous Renewal survey as required in 5.1. However, internal examination of fuel oil tanks and pressure testing of all tanks are not required unless deemed necessary by the attending Surveyor.

4.2.3.2 In application of 4.2.3.1, 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 2.1.4.

4.2.3.3 In application of 4.2.3.1, an underwater survey may be considered in lieu of the requirement of 2.2.2.

4.2.4 Double Skin Bulk Carriers over 15 years of age

The following is to apply:

4.2.4.1 The requirements of the intermediate survey are to be to the same extent as the previous Renewal survey as required in 2 and 5.1.

However, internal examination of fuel oil tanks and pressure testing of all tanks are not required unless deemed necessary by the attending Surveyor.

4.2.4.2 In application of 4.2.4.1, 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 2.1.4.

4.2.4.3 In application of 4.2.4.1, 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 PREPARATION FOR SURVEY

5.1 SURVEY PROGRAMME

5.1.1 The Owner in co-operation with the Register is to work out a specific Survey Programme prior to the commencement of any part of:
- the Renewal Survey;
- the Intermediate Survey for double skin bulk carriers over 10 years of age.

The Survey Programme is to be in a written format. The survey is not to commence until the Survey programme has been agreed.

5.1.1.1 Prior to the development of the survey programme, the survey planning questionnaire is to be completed by the owner, and forwarded to the Register.

5.1.1.2 The Survey Programme at Intermediate Survey may consist of the Survey Programme at the previous Renewal survey supplemented by the Executive Hull Summary of that Renewal survey and later relevant survey reports.

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

5.1.2 In developing the survey programme, the following documentation is to be collected and consulted with a view to selecting holds, tanks, areas, and structural elements to be examined:
- survey status and basic ship information,
- documentation on-board, as described in 6.2 and 6.3;
- main structural plans ( scantlings drawings), including information regarding use of high tensile steels (HTS);
- relevant previous survey and inspection reports from both the Register and the Owner;
- information regarding the use of the ship’s holds and tanks, typical cargoes and other relevant data;
- information regarding corrosion prevention level on the new-building;
- information regarding the relevant maintenance level during operation.

5.1.3 The submitted survey programme is to account for and comply, as a minimum, with the requirements of Tables I and II and paragraph 2.5 for close-up survey, thickness measurement and tank testing, respectively, and is to include relevant information including at least:
- basic ship information and particulars;
- main structural plans ( scantlings drawings), including information regarding use of high tensile steels (HTS);
- plan of holds and tanks;
- list of holds and tanks with information on use, protection and condition of coating;
- conditions for survey (e.g., information regarding hold and tank cleaning, gas freeing, ventilation, lighting, etc.);
- provisions and methods for access to structures;
- equipment for surveys;
- nomination of holds and tanks and areas for close-up survey (per 2.3);
- nominations of sections and areas for thickness measurement (per 2.4);
- nomination of tanks for tank testing (per 2.5);
- damage experience related to the ship in question.

5.1.4 The Register will advise the Owner of the maximum acceptable structural corrosion diminution levels applicable to the vessel.

5.2 CONDITIONS FOR SURVEY

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

5.2.1.1 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 Register and are to be in accordance with IACS PR 37.

5.2.1.2 Details of the means of access are to be provided in the survey planning questionnaire.

5.2.1.3 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.

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

5.2.3 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 areas to be renewed.

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

5.2.5 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.
5.3  ACCESS TO STRUCTURES

5.3.1 For overall surveys, means are to be provided to enable the Surveyor to examine the hull structure in a safe and practical way.

5.3.2 For close-up surveys, 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, e.g. ladders and passages through structures;
- hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms;
- portable ladders;
- boats or rafts;
- other equivalent means.

5.4  EQUIPMENT FOR SURVEY

5.4.1 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.

5.4.2 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.

5.4.3 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.

5.4.4 Adequate and safe lighting is to be provided for the safe and efficient conduct of the survey.

5.4.5 Adequate protective clothing is to be made available and used (e.g. safety helmet, gloves, safety shoes, etc.) during the survey.

5.5  RESCUE AND EMERGENCY RESPONSE EQUIPMENT

5.5.1 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.

5.6  SURVEY AT SEA OR AT ANCHORAGE

5.6.1 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 5.1, 5.2, 5.3 and 5.4.

5.6.2 A communication system is to be arranged between the survey party in the spaces under examination and the responsible officer on deck. This system is to also include the personnel in charge of ballast pump handling if boats or rafts are used.

5.6.3 Surveys of tanks or applicable holds 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.

5.6.4 When rafts or boats are used for close-up surveys, the following conditions are to be observed:
- only rough duty, inflatable rafts or boats, having satisfactory residual buoyancy and stability even if one chamber is ruptured, should be used;
- the boat or raft should be tethered to the access ladder and an additional person should be stationed down the access ladder with a clear view of the boat or raft;
- appropriate lifejackets should be available for all participants;
- the surface of water in the tank should be calm (under all foreseeable conditions the expected rise of water within the tank should not exceed 0.25 m) and the water level either stationary. On no account should the level of the water be rising while the boat or raft is in use;
- the tank or space must contain clean ballast water only. Even a thin sheen of oil on the water is not acceptable;
- at no time should the water level 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 should only 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.

5.6.5 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.

5.6.6 If the depth of the webs is more than 1.5 m, rafts or boats alone may be allowed only:
- when the coating of the under deck structure is in GOOD condition and there is no evidence of wastage; or
- if a permanent means of access is provided in each bay to allow safe entry and exit. This means:
  i. access direct from the deck via a vertical ladder and a small platform fitted approximately 2 m below the deck in each bay; or
ii. 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.

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

5.6.7 The use of rafts or boats alone in paragraphs 5.6.5 and 5.6.6 does not preclude the use of boats or rafts to move about within a tank during a survey.

NOTE: Reference is made to IACS Recommendation 39 – Guidelines for use of Boats or Rafts for Close-up Surveys.

5.7 SURVEY PLANNING MEETING

5.7.1 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.

5.7.2 Prior to commencement of any part of the renewal and intermediate survey, a survey planning meeting is to be held between the attending surveyor(s), the owner’s representative in attendance, the thickness measurement firm representative, where involved, and the master of the ship or an appropriately qualified representative appointed by the master or Company for the purpose to ascertain that all the arrangements envisaged in the survey programme are in place, so as to ensure the safe and efficient conduct of the survey work to be carried out. See also 7.1.2.

5.7.3 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/descaling, illumination, ventilation, personal safety);
.3 extent of the thickness measurements;
.4 acceptance criteria (refer to the list of minimum thickness);
.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; and
.9 communication between attending surveyor(s) the thickness measurement firm operator(s) and owner representative(s) concerning findings.
6 DOCUMENTATION ON BOARD

6.1 GENERAL

6.1.1 The Owner is to supply and maintain on board documentation as specified in 6.2 and 6.3, which is to be readily available for the Surveyor.

6.1.2 The documentation is to be kept on board for the life time of the ship.

6.1.3 For ships defined in the Rules, Part - General requirements, Ch. 2 - Survey during construction and initial survey, under the note in item 1.2.2.27, the following is to be applied to surveys commenced on or after 1st July 2016:

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.

6.2 SURVEY REPORT FILE

6.2.1 A Survey Report File is to be a part of the documentation on board consisting of:
- reports of structural surveys;
- Executive Hull Summary;
- thickness measurement reports.

6.2.2 The Survey Report File is to be available also in the Owner's and the Registers management offices.

6.3 SUPPORTING DOCUMENTS

6.3.1 The following additional documentation is to be available onboard:
- Survey Programme as required by 5.1 until such time as the Renewal Survey or Intermediate Survey, as applicable, has been completed;
- main structural plans of cargo holds and ballast tanks (for CSR ships these plans are to include for each structural element both the as-built and renewal thickness. Any thickness for voluntary addition is also to be clearly indicated on the plans. The midship section plan to be supplied on board the ship is to include the minimum allowable hull girder sectional properties for hold transverse section in all cargo holds;
- previous repair history;
- cargo and ballast history;
- inspections by ship’s personnel with reference to:
  - structural deterioration in general;
  - leakage in bulkheads and piping;
- condition of coating or corrosion prevention system, if any;
- any other information that will help identify Suspect Areas requiring inspection.

6.3.2 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.

6.4 REVIEW OF DOCUMENTATION ON BOARD

6.4.1 Prior to inspection, the Surveyor is to examine the completeness of the documentation onboard, and its contents as a basis for the survey.

6.4.2 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.

6.4.2.1 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.

6.4.2.2 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.

6.4.3 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.
7 PROCEDURES FOR THICKNESS MEASUREMENTS

7.1 GENERAL

7.1.1 The required thickness measurements, if not carried out by the Register itself, are to be witnessed by a Surveyor of the Register. The Surveyor is to be on board to the extent necessary to control the process.

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

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

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

7.2 CERTIFICATION OF THICKNESS MEASUREMENTS FIRM

7.2.1 The thickness measurements are to be carried out by a qualified firm certified by the Register according to principles stated in the Rules, Part 1 - General requirements, Ch. 4 - Approval of manufacturers and service suppliers.

7.3 NUMBER AND LOCATIONS OF MEASUREMENTS

7.3.1 Application

The item 7.3 only applies to vessels built under the IACS Common Structural Rules* (CSR). For vessels not built under IACS Common Structural Rules, the requirements for number and locations of measurements are according to the Rules of the Register and/or specific IACS URs depending on ship’s age and structural elements concerned.

* IACS Common Structural Rules mean IACS Common Structural Rules for Bulk Carriers (IACS CSR for Bulk Carriers) or IACS Common Structural Rules for Bulk Carriers and Oil Tankers (IACS CSR BC & OT).

7.3.2 Number of measurements

Considering the extent of thickness measurements according to the different structural elements of the ship and surveys (Renewal, intermediate and annual), the locations of the points to be measured are given for the most important items of the structure.

7.3.3 Locations of measurements

Table 1 provides explanations and/or interpretations for the application of those requirements indicated in the Rules, which refer to both systematic thickness measurements related to the calculation of global hull girder strength and specific measurements connected to close-up surveys.

Fig. 4 to Fig. 9 are provided to facilitate the explanations and/or interpretations given in Table 1, to show typical arrangements of double side skin bulk carriers.

Table 1
Interpretations of rule requirements for the locations and number of points to be measured for CSR bulk carriers (double skin)

<table>
<thead>
<tr>
<th>Item</th>
<th>Interpretation</th>
<th>Figure reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selected plates on deck, tank top, bottom, double bottom and wind-and-water area</td>
<td>«Selected» means at least a single point on one out of three plates, to be chosen on representative areas of average corrosion</td>
<td></td>
</tr>
<tr>
<td>All deck, tank top and bottom plates and wind-and-water strakes</td>
<td>At least two points on each plate to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion</td>
<td></td>
</tr>
<tr>
<td>Transverse section</td>
<td>A transverse section includes all longitudinal members such as plating, longitudinals and girders at the deck, sides, bottom, inner bottom, hopper sides, inner sides and top wing inner sides.</td>
<td>Fig 4</td>
</tr>
<tr>
<td>All cargo hold hatch covers and coamings</td>
<td>Including plates and stiffeners</td>
<td>Locations of points are given in Fig 5</td>
</tr>
<tr>
<td>Item</td>
<td>Interpretation</td>
<td>Figure reference</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Transverse section of deck plating outside line of cargo hatch openings</td>
<td>Two single points on each deck plate (to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion) between the ship sides and hatch coamings in the transverse section concerned</td>
<td></td>
</tr>
</tbody>
</table>
| All deck plating and underdeck structure inside line of hatch openings between cargo hold hatches | «All deck plating» means at least two points on each plate to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion.  
«Under deck structure»: at each short longitudinal girder: three points for web plating (fwd/middle/aft), single point for face plate, one point for web plating and one point for face plating of transverse beam in way. At each ends of transverse beams, one point for web plating and one point for face plating | Extent of areas is shown in Annex D  
Locations of points are given in Fig 9 |
| Transverse frame in double skin tank                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Fig 4             |
| Transverse bulkheads in cargo holds                                  | Includes bulkhead plating, stiffeners and girders, including internal structure of upper and lower stools, where fitted. Two selected bulkheads: one is to be the bulkhead between the two foremost cargo holds and the second may be chosen in other positions                                                                                                                                                                                                                      | Areas of measurements are shown in Annex D  
Locations of points are given in Fig 7 |
| One transverse bulkhead in each cargo hold                           | This means that the close-up survey and related thickness measurements are to be performed on one side of the bulkhead; the side is to be chosen based on the outcome of the overall survey of both sides. In the event of doubt, the Surveyor may also require (possibly partial) close-up survey on the other side                                                                                                                                                                                                                   | Areas of measurements are shown in Annex D  
Locations of points are given in Fig 7 |
| Transverse bulkheads in one topside, hopper and double bottom ballast tank | Includes bulkhead and stiffening systems.  
The ballast tank is to be chosen based on the history of ballasting among those prone to have the most severe conditions                                                                                                                                                                                                                                                                                         | Locations of points are given in Fig 8 |
| Transverse webs in ballast tanks                                     | Includes web plating, face plates, stiffeners and associated plating and longitudinals.  
One of the representative tanks of each type (i.e. topside or hopper or side tank) is to be chosen in the forward part                                                                                                                                                                                                                                                                                   | Areas of measurements are shown in Annex D  
Locations of points are given in Fig 6 |
NOTE: Measurements are to be taken on both port and starboard sides of the selected transverse section.

Figure 4 - Transverse section of a double skin bulk carrier

1. Three sections at L/4, L/2, 3L/4 of hatch cover length, including:
   - one measurement of each hatch cover plate and skirt plate
   - measurements of adjacent beams and stiffeners
   - one measurement of coaming plates and coaming flange, each side
2. Measurements of both ends of hatch cover skirt plate, coaming plate and coaming flange
3. One measurement (two points for web plate and one point for face plate) of one out of three hatch coaming brackets and bars, on both sides and both ends

Figure 5 - Locations of measurements on hatch covers and coamings
Figure 6 - Locations of measurements on structural members in ballast tanks of double skin bulk carriers (topside or hopper or side tank)

NOTE: Measurements to be taken in each shaded area as per views A - A and B - B

Figure 7 - Locations of measurements on cargo hold transverse bulkheads (additional measurements to internal structure of upper and lower stools to be added, e.g. two points in the upper and two points in the lower stools to be indicated in section A - A)
NOTE: Measurements to be taken in each vertical section as per view A – A

Figure 8 - Locations of measurements on transverse bulkheads of topside, hopper and double bottom tanks (two additional measurements to internal structure of double bottom tank to be added at midspan)

Figure 9 - Locations of measurements on underdeck structure

**7.4 REPORTING**

7.4.1 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 measuring equipment, names of personnel and their qualifications and has to be signed by the operator.

7.4.2 The Surveyor is to review the final thickness measurement report and countersign the cover page.
8 ACCEPTANCE CRITERIA

8.1 GENERAL

8.1.1 For vessels built under IACS Common Structural Rules, the Acceptance Criteria is according to Ch.13 of IACS Common Structural Rules* (CSR) and as specified in 8.2, 8.3 and 8.4.

* Ch.13 of IACS CSR for Bulk Carriers, or Ch. 13, Part 1 of IACS CSR BC & OT

8.1.2 For vessels not built under IACS Common Structural Rules, the Acceptance Criteria are according to the Rules of the Register and/or specific IACS URs depending on ship’s age and structural elements concerned, e.g. UR S18 for corrugated transverse watertight bulkheads, UR S19 for the transverse watertight corrugated bulkhead between Cargo Holds Nos. 1 and 2, and UR S21 for all cargo hatch covers and hatch forward and side coamings on exposed decks in position 1 (as defined in ILLC), as applicable.

8.2 ACCEPTANCE CRITERIA FOR PITTIND CORROSION OF CSR SHIPS

8.2.1 Side structures
If pitting intensity in an area where coating is required, according to IACS Common Structural Rules* (CSR), is higher than 15% (see Figure 1), thickness measurements are to be performed to check the extent of pitting corrosion. The 15% is based on pitting or grooving on only one side of a plate.

* Sec. 5, Ch. 3 of IACS CSR for Bulk Carriers, or Sec. 4, Ch. 3, Part 1 of IACS CSR BC & OT

In cases where pitting is exceeding 15%, as defined above, an area of 300 mm or more, at the most pitted part of the plate, is to be cleaned to bare metal and the thickness is to be measured in way of the five deepest pits within the cleaned area. The least thickness measured in way of any of these pits is to be taken as the thickness to be recorded.

The minimum remaining thickness in pits, grooves or other local areas is to be greater than 70% of the as-built thickness, in mm, of the side shell, hopper tank and topside tank plating attached to the each side frame, over a width up to 30 mm from each side of it, without being greater than t_en.

8.2.2 Other structures
For plates with pitting intensity less than 20%, see Figure 1, the measured thickness, t_m, of any individual measurement is to meet the lesser of the following criteria:

\[ t_m \geq 0.7 \left( t_{\text{as-built}} - t_{\text{vol add}} \right) \text{ mm} \]

\[ t_m \geq t_{\text{en}} - 1 \text{ mm} \]

where:

- \( t_{\text{as-built}} \) As-built thickness of the member, in mm
- \( t_{\text{vol add}} \) Voluntary thickness addition; thickness, in mm, voluntarily added as the Owner’s extra margin for corrosion wastage in addition to \( t_c \)
- \( t_{\text{en}} \) Renewal thickness; minimum allowable thickness, in mm, below which renewal of structural members is to be carried out
- \( t_c \) Total corrosion addition, in mm, defined in Ch. 3, Sec 3 of IACS Common Structural Rules* (CSR)
- \( t_m \) Measured thickness, in mm, on one item, i.e. average thickness on one item using the various measurements taken on this same item during periodical ship’s in service surveys

* Sec. 3, Ch. 3 of IACS CSR for Bulk Carriers, or Sec. 3, Ch. 3, Part 1 of IACS CSR BC & OT

The average thickness across any cross section in the plating is not to be less than the renewal criteria for general corrosion given in Chapter 13 of CSR.

8.3 ACCEPTANCE CRITERIA FOR EDGE CORROSION OF CSR SHIPS

8.3.1 Provided that the overall corroded height of the edge corrosion of the flange, or web in the case of flat bar stiffeners, is less than 25%, see Figure 2, of the stiffener flange breadth or web height, as applicable, the measured thickness, t_m, is to meet the lesser of the following criteria:

\[ t_m \geq 0.7 \left( t_{\text{as-built}} - t_{\text{vol add}} \right) \text{ mm} \]

\[ t_m \geq t_{\text{en}} - 1 \text{ mm} \]

8.3.2 The average measured thickness across the breadth or height of the stiffener is not to be less than that defined in IACS Common Structural Rules* (CSR).

* Ch.13 of IACS CSR for Bulk Carriers, or Ch. 13, Part 1 of IACS CSR BC & OT

8.3.3 Plate edges at openings for manholes, lightening holes etc. may be below the minimum thickness given in IACS Common Structural Rules* (CSR) provided that:

a) the maximum extent of the reduced plate thickness, below the minimum given in IACS Common Structural Rules* (CSR), from the opening edge is not more than 20% of the smallest dimension of the opening and does not exceed 100 mm.

b) rough or uneven edges may be cropped-back provided that the maximum dimension of the opening is not increased by more than 10% and the remaining thickness of the new edge is not less than t_en - 1mm.

* Ch.13 of IACS CSR for Bulk Carriers, or Ch. 13, Part 1 of IACS CSR BC & OT
8.4 ACCEPTANCE CRITERIA FOR GROOVING CORROSION OF CSR SHIPS

8.4.1 Where the groove breadth is a maximum of 15% of the web height, but not more than 30mm, see Figure 3, the measured thickness, $t_m$, in the grooved area is to meet the lesser of the following criteria:

$$t_m \geq 0.75 (t_{as-built} - t_{vol add}) \text{ mm}$$

$$t_m \geq t_{rn} - 0.5 \text{ mm}$$

but is not to be less than:

$$t_m = 6 \text{ mm}$$

8.4.2 Structural members with areas of grooving greater than those in 8.4.1 above are to be assessed based on the criteria for general corrosion as defined in IACS Common Structural Rules* (CSR) using the average measured thickness across the plating/stiffener.

* Ch.13 of IACS CSR for Bulk Carriers, or Ch. 13, Part 1 of IACS CSR BC & OT
9 REPORTING AND EVALUATION OF SURVEY

9.1 EVALUATION OF SURVEY REPORT

9.1.1 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.

9.1.1.1 For CSR bulk carriers, the ship’s longitudinal strength is to be evaluated by using the thickness of structural members measured, renewed and reinforced, as appropriate, during the Renewal surveys carried out after the ship reached 15 years of age (or during the Renewal survey no. 3, if this is carried out before the ship reaches 15 years) in accordance with the criteria for longitudinal strength of the ship’s hull girder for CSR bulk carriers specified in IACS Common Structural Rules* (CSR).

* Ch.13 of IACS CSR for Bulk Carriers, or Ch. 13, Part 1 of IACS CSR BC & OT.

9.1.1.2 The final result of evaluation of the ship’s longitudinal strength required in 9.1.1.1, after renewal or reinforcement work of structural members, if carried out as a result of initial evaluation, is to be reported as a part of the Executive Hull Summary.

9.2 REPORTING

9.2.1 Principles for survey reporting are shown in the Annex II of IACS UR Z10.5.

9.2.2 When a survey is split between different survey stations, a report is to be made for each portion of the survey. A list of item 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.

9.2.3 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 the Head Office of the Register.

### Table 1, Sheet 1
MINIMUM REQUIREMENTS FOR CLOSE-UP SURVEY AT RENEWAL HULL SURVEY OF DOUBLE SKIN BULK CARRIERS, EXCLUDING ORE CARRIERS

<table>
<thead>
<tr>
<th>I Renewal survey</th>
<th>II Renewal survey</th>
<th>III Renewal survey</th>
<th>IV Renewal survey subsequent surveys</th>
</tr>
</thead>
<tbody>
<tr>
<td>age ≤ 5</td>
<td>5 &lt; age ≤ 10</td>
<td>10 &lt; age ≤ 15</td>
<td>age &gt; 15</td>
</tr>
<tr>
<td>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)</td>
<td>One transverse web with associated plating and longitudinals as applicable in each water ballast tank. (A)</td>
<td>All transverse webs with associated plating and longitudinals as applicable in each water ballast tank. (A)</td>
<td>All transverse webs with associated plating and longitudinals as applicable in each water ballast tank. (A)</td>
</tr>
<tr>
<td>Forward and aft transverse bulkheads including stiffening system in a transverse section including topside, hopper side and double side ballast tanks on one side of the ships (i.e. port or starboard). (A)</td>
<td>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)</td>
<td>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 in all double side tanks. (B)</td>
<td>All 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 in all double side tanks. (B)</td>
</tr>
<tr>
<td>Areas (C) - (E) as for age interval 10 to 15 years.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I Renewal survey</td>
<td>II Renewal survey</td>
<td>III Renewal survey</td>
<td>IV Renewal survey</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>age ≤ 5</td>
<td>5 &lt; age ≤ 10</td>
<td>10 &lt; age ≤ 15</td>
<td>age &gt; 15</td>
</tr>
<tr>
<td>Two selected cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted. (C)</td>
<td>One transverse bulkhead in each cargo hold, including internal structure of upper and lower stools, where fitted. (C)</td>
<td>All cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted. (C)</td>
<td></td>
</tr>
<tr>
<td>All cargo hold hatch covers and coamings (plating and stiffeners). (D)</td>
<td>All cargo hold hatch covers and coamings (plating and stiffeners). (D)</td>
<td>All cargo hold hatch covers and coamings (plating and stiffeners). (D)</td>
<td></td>
</tr>
<tr>
<td>All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches. (E)</td>
<td></td>
<td>All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches. (E)</td>
<td></td>
</tr>
</tbody>
</table>

(A), (B), (C), (D) and (E) are areas to be subjected to close-up surveys and thickness measurements (see figures in Annex D).

(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, stiffeners and girders.

(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 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 sheddors 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.
Table I, Sheet 2

MINIMUM REQUIREMENTS FOR CLOSE-UP SURVEY AT RENEWAL HULL SURVEY OF ORE CARRIERS

<table>
<thead>
<tr>
<th>I Renewal survey</th>
<th>II Renewal survey</th>
<th>III Renewal survey</th>
<th>IV Renewal survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>age ≤ 5</td>
<td>5 &lt; age ≤ 10</td>
<td>10 &lt; age ≤ 15</td>
<td>subsequent surveys</td>
</tr>
<tr>
<td>One web frame ring complete including adjacent structural members in a ballast wing tank. (A)</td>
<td>All web frame rings complete including adjacent structural members in a ballast wing tank. (A)</td>
<td>All transverse bulkheads complete including girder system and adjacent structural members - in each ballast tank. (A)</td>
<td>As for Renewal survey for age from 10 to 15 years.</td>
</tr>
<tr>
<td>One transverse bulkhead lower part - including girder system and adjacent structural members - in a ballast tank. (A)</td>
<td>One deck transverse including adjacent deck structural members in each remaining ballast tank. (A)</td>
<td>One web frame ring complete including adjacent structural members in each wing void space. (A)</td>
<td></td>
</tr>
<tr>
<td>Forward and aft transverse bulkheads complete - including girder system and adjacent structural members - in a ballast wing tank. (A)</td>
<td>One transverse bulkhead lower part - including girder system and adjacent structural members - in each remaining ballast tank. (A)</td>
<td>Additional web frame rings in void spaces as deemed necessary by the Register. (A)</td>
<td></td>
</tr>
<tr>
<td>Two selected cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted. (C)</td>
<td>One transverse bulkhead in each cargo hold, including internal structure of upper and lower stools, where fitted. (C)</td>
<td>All cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted. (C)</td>
<td>Areas (C) - (E) as for age interval 10 to 15 years.</td>
</tr>
<tr>
<td>All cargo hold hatch covers and coamings (plating and stiffeners). (D)</td>
<td>All cargo hold hatch covers and coamings (plating and stiffeners). (D)</td>
<td>All cargo hold hatch covers and coamings (plating and stiffeners). (D)</td>
<td></td>
</tr>
<tr>
<td>All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches. (E)</td>
<td>All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches. (E)</td>
<td>All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches. (E)</td>
<td></td>
</tr>
</tbody>
</table>

(A), (C), (D) and (E) are areas to be subjected to close-up surveys and thickness measurements (see figures in Annex D).

(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.

(C): Cargo hold transverse bulkheads plating, stiffeners and girders.

(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 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.
### Table II
MINIMUM REQUIREMENTS TO THICKNESS MEASUREMENTS AT RENEWAL HULL SURVEY OF DOUBLE SKIN BULK CARRIERS

<table>
<thead>
<tr>
<th>I Renewal survey</th>
<th>II Renewal survey</th>
<th>III Renewal survey</th>
<th>IV Renewal survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>age ≤ 5</td>
<td>age ≤ 10</td>
<td>age ≤ 15</td>
<td>subsequent surveys</td>
</tr>
<tr>
<td>Suspect area</td>
<td>Suspect area</td>
<td>Suspect areas</td>
<td>Suspect areas</td>
</tr>
<tr>
<td>Within the cargo length:</td>
<td>Within the cargo length:</td>
<td>Within the cargo length:</td>
<td>Within the cargo length:</td>
</tr>
<tr>
<td>- two transverse sections of deck plating outside line of cargo hatch openings</td>
<td>- each deck plate outside line of cargo hatch openings</td>
<td>- two transverse sections, one in the amidship area, outside line of cargo hatch openings</td>
<td>- each deck plate outside line of cargo hatch openings</td>
</tr>
<tr>
<td>Wind and water strakes in way of the two transverse sections considered above</td>
<td>Selected wind and water strakes outside the cargo length area</td>
<td>All wind and water strakes, full length</td>
<td>All wind and water strakes, full length</td>
</tr>
<tr>
<td>Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I/Sheet 1 or Table I/Sheet 2, as applicable.</td>
<td>Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I/Sheet 1 or Table I/Sheet 2, as applicable.</td>
<td>Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I/Sheet 1 or Table I/Sheet 2, as applicable.</td>
<td>Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I/Sheet 1 or Table I/Sheet 2, as applicable.</td>
</tr>
</tbody>
</table>

### Table III, Sheet 1
REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION OF DOUBLE SKIN BULK CARRIERS WITHIN THE CARGO LENGTH AREA

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottom, inner bottom and hopper structure plating</td>
<td>Minimum of three bays across double bottom tank, including aft bay</td>
<td>5-point pattern for each panel between longitudinals and floors</td>
</tr>
<tr>
<td></td>
<td>Measurements around and under all suction bell mouths</td>
<td></td>
</tr>
<tr>
<td>Bottom, inner bottom and hopper structure longitudinals</td>
<td>Minimum of three longitudinals in each bay where bottom plating measured</td>
<td>Three measurements in line across flange and three measurements on vertical web</td>
</tr>
<tr>
<td>Bottom girders, including the watertight ones</td>
<td>At fore and aft watertight floors and in centre of tanks</td>
<td>Vertical line of single measurements on girder plating with one measurement between each panel stiffener, or a minimum of three measurements</td>
</tr>
<tr>
<td>Bottom floors, including the watertight ones</td>
<td>Three floors in bays where bottom plating measured, with measurements at both ends and middle</td>
<td>5-point pattern over two square metre area</td>
</tr>
</tbody>
</table>
### BOTTOM, INNER BOTTOM AND HOPPER STRUCTURE

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hopper structure web frame ring</td>
<td>- Three floors in bays where bottom plating measured</td>
<td>- 5-point pattern over one square metre of plating. - Single measurements on flange</td>
</tr>
<tr>
<td>Hopper structure transverse watertight bulkhead or swash bulkhead</td>
<td>- Lower 1/3 of bulkhead</td>
<td>- 5-point pattern over one square metre of plating</td>
</tr>
<tr>
<td></td>
<td>- Upper 2/3 of bulkhead</td>
<td>- 5-point pattern over two square metre of plating</td>
</tr>
<tr>
<td></td>
<td>- Stiffeners (minimum of three)</td>
<td>- 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</td>
</tr>
<tr>
<td>Panel stiffening</td>
<td>- Where applicable</td>
<td>- Single measurements</td>
</tr>
</tbody>
</table>

### REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION OF DOUBLE SKIN BULK CARRIERS WITHIN THE CARGO LENGTH AREA

#### DECK STRUCTURE INCLUDING CROSS STRIPS, MAIN CARGO HATCHWAYS, HATCH COVERS, COAMINGS AND TOPSIDE TANKS

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross Deck Strip plating</td>
<td>Suspect Cross Deck Strip plating</td>
<td>5-point pattern between underdeck stiffeners over 1 metre length</td>
</tr>
<tr>
<td>Underdeck Stiffeners</td>
<td>Transverse members</td>
<td>5-point pattern at each end and mid span</td>
</tr>
<tr>
<td></td>
<td>Longitudinal member</td>
<td>5-point pattern on both web and flange</td>
</tr>
<tr>
<td>Hatch Covers</td>
<td>Side and end skirts, each three locations</td>
<td>5-point pattern at each location</td>
</tr>
<tr>
<td></td>
<td>Three longitudinal bands, outboard strakes (2) and centreline strake (1)</td>
<td>5-point measurement each band</td>
</tr>
<tr>
<td>Hatch Coamings</td>
<td>Each side and end of coaming, one band lower 1/3, one band upper 2/3 of coaming</td>
<td>5-point measurement each band, i.e. end or side coaming</td>
</tr>
<tr>
<td>Topside Ballast Tanks</td>
<td>a) watertight transverse bulkheads:</td>
<td>5-point pattern over 1 sq. metre of plating</td>
</tr>
<tr>
<td></td>
<td>- Lower 1/3 of bulkhead</td>
<td>5-point pattern over 1 sq. metre of plating</td>
</tr>
<tr>
<td></td>
<td>- Upper 2/3 of bulkhead</td>
<td>5-point pattern over 1 metre length</td>
</tr>
<tr>
<td></td>
<td>- Stiffeners</td>
<td>5-point pattern over 1 sq. metre of plating</td>
</tr>
<tr>
<td>Topside Ballast Tanks</td>
<td>b) two representative swash transverse bulkheads:</td>
<td>5-point pattern over 1 sq. metre of plating</td>
</tr>
<tr>
<td></td>
<td>- Lower 1/3 of bulkhead</td>
<td>5-point pattern over 1 sq. metre of plating</td>
</tr>
<tr>
<td></td>
<td>- Upper 2/3 of bulkhead</td>
<td>5-point pattern over 1 metre length</td>
</tr>
<tr>
<td></td>
<td>- Stiffeners</td>
<td>5-point pattern over 1 sq. metre of plating</td>
</tr>
<tr>
<td>Topside Ballast Tanks</td>
<td>c) three representative bays of slope plating:</td>
<td>5-point pattern over 1 sq. metre of plating</td>
</tr>
<tr>
<td></td>
<td>- Lower 1/3 of tank</td>
<td>5-point pattern over 1 sq. metre of plating</td>
</tr>
<tr>
<td></td>
<td>- Upper 2/3 of tank</td>
<td>5-point pattern over 1 metre length</td>
</tr>
<tr>
<td>Topside Ballast Tanks</td>
<td>d) Longitudinals, suspect and adjacent</td>
<td>5-point pattern on both web and flange over 1 metre length</td>
</tr>
</tbody>
</table>
### DECK STRUCTURE INCLUDING CROSS STRIPS, MAIN CARGO HATCHWAYS, HATCH COVERS, COAMINGS AND TOPSIDE TANKS

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Deck Plating</td>
<td>Suspect plates and adjacent (4)</td>
<td>5-point pattern over 1 sq. metre of plating</td>
</tr>
<tr>
<td>Main Deck Longitudinals</td>
<td>Suspect plates</td>
<td>5-point pattern on both web and flange over 1 metre length</td>
</tr>
<tr>
<td>Web Frames/Transverses</td>
<td>Suspect plates</td>
<td>5-point pattern over 1 sq. metre</td>
</tr>
</tbody>
</table>

### REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION OF DOUBLE SKIN BULK CARRIERS WITHIN THE CARGO LENGTH AREA

#### STRUCTURE IN DOUBLE SIDE SPACES OF DOUBLE SKIN BULK CARRIERS INCLUDING WING VOID SPACES OF ORE CARRIERS

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Side shell and inner side plating:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- upper strake and strakes in way of horizontal girders</td>
<td>Plating between each pair of transverse frames/longitudinals in a minimum of three bays (along the tank)</td>
<td>Single measurement</td>
</tr>
<tr>
<td>- all other strakes</td>
<td>Plating between every third pair of longitudinals in same three bays</td>
<td>Single measurement</td>
</tr>
<tr>
<td><strong>Side shell and inner side transverse frames/longitudinals on:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- upper strake</td>
<td>Each transverse frame/longitudinal in same three bays</td>
<td>Three measurements across web and 1 measurement on flange</td>
</tr>
<tr>
<td>- all other strakes</td>
<td>Every third transverse frame/longitudinal in same three bays</td>
<td>Three measurements across web and 1 measurement on flange</td>
</tr>
<tr>
<td><strong>Transverse frames / Longitudinals:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- brackets</td>
<td>Minimum of three at top, middle and bottom of tank in same three bays</td>
<td>5-point pattern over area of bracket</td>
</tr>
<tr>
<td><strong>Vertical web and transverse bulkheads:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- strakes in way of horizontal girders</td>
<td>Minimum of two webs and both transverse bulkheads</td>
<td>5-point pattern over approx. two square metre area</td>
</tr>
<tr>
<td>- other strakes</td>
<td>Minimum of two webs and both transverse bulkheads</td>
<td>Two measurements between each pair of vertical stiffeners</td>
</tr>
<tr>
<td><strong>Horizontal girders</strong></td>
<td>Plating on each girder in a minimum of three bays</td>
<td>Two measurements between each pair of longitudinal girder stiffeners</td>
</tr>
<tr>
<td><strong>Panel stiffening</strong></td>
<td>Where applicable</td>
<td>Single measurements</td>
</tr>
</tbody>
</table>
### Table III, Sheet 4

**REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION OF DOUBLE SKIN BULK CARRIERS WITHIN THE CARGO LENGTH AREA**

<table>
<thead>
<tr>
<th>Structural member</th>
<th>Extent of measurement</th>
<th>Pattern of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower stool, where fitted</strong></td>
<td>- Transverse band within 25mm of welded connection to inner bottom&lt;br&gt;- Transverse band within 25mm of welded connection to shelf plate</td>
<td>- Five-point pattern between stiffeners over one metre length&lt;br&gt;- Five-point pattern between stiffeners over one metre length</td>
</tr>
<tr>
<td><strong>Transverse bulkheads</strong></td>
<td>- Transverse band at approximately mid height&lt;br&gt;- Transverse band at part of bulkhead adjacent to upper deck or below upper stool shelf plate (for those ships fitted with upper stools)</td>
<td>- Five-point pattern over one square metre of plating&lt;br&gt;- Five-point pattern over one square metre of plating</td>
</tr>
</tbody>
</table>

### Table IV

**MINIMUM REQUIREMENTS OF OVERALL AND CLOSE-UP SURVEY AND THICKNESS MEASUREMENTS AT INTERMEDIATE SURVEY OF DOUBLE SKIN BULK CARRIERS**

<table>
<thead>
<tr>
<th>AGE OF SHIP AT TIME OF INTERMEDIATE SURVEY DUE DATE</th>
<th>5 &lt; age ≤ 10</th>
<th>10 &lt; age ≤ 15</th>
<th>age &gt; 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>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)</td>
<td>The requirements of the previous Renewal survey&lt;br&gt;See (4.2.3)</td>
<td>The requirements of the previous Renewal survey&lt;br&gt;See (4.2.4)</td>
<td></td>
</tr>
<tr>
<td>Overall and close-up survey of Suspect Areas identified at previous surveys</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall survey of all cargo holds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thickness measurements to an extent sufficient to determine both general and local corrosion levels at areas subject to close-up survey at 'suspect areas' identified at previous surveys</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ANNEX D
Sketches
Oil tankers, ore/oil ships, etc.
Close up survey requirements

Oil tanker
Typical transverse section Close-up survey

Oil/ore ship
Typical transverse section Close-up survey

Thickness to be reported on TM3 and TM4 as appropriate

Oil tanker
Typical transverse bulkhead

Oil/ore ship
Typical transverse bulkhead

Thickness to be reported on TM5
Typical transverse frames in cargo hold
Thickness gauging area A

Non - typical transverse frame in cargo hold
Thickness gauging area A

Upper part
Mid part
Lower part
Close-up survey and thickness measurement areas
BULK CARRIER – Areas subject to close-up survey and thickness measurements

Typical transverse section
Areas A, B and D

A cargo hold, transverse bulkhead

Area C

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

Area E

Hatch opening  E  Hatch opening  E  Hatch opening
Close-up survey and thickness measurement

TANKER FOR OIL - Typical transverse section indication longitudinal and transverse members
Close-up survey and thickness measurement
BULK CARRIER - Typical transverse section indication longitudinal and transverse members

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Bilge plating</td>
<td>10. Topside tank sloping plating longitudinals</td>
<td>27.</td>
<td>32.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15. Hopper side plating</td>
<td>32.</td>
<td>37.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17. Inner bottom longitudinals</td>
<td>34.</td>
<td>39.</td>
<td></td>
</tr>
</tbody>
</table>
CHEMICAL TANKER

Representative transverse section of double skin chemical tanker. Areas A & B and 1 and 2
Representative transverse section of double skin chemical tanker. Areas C & D and 3, 4 and 5

Representative transverse section of double skin chemical tanker. Areas 6 and 7
Close-up survey and thickness measurement

TANKER FOR OIL / ORE CARRIER - Typical transverse section indication longitudinal and transverse members
Close-up survey and thickness measurement
DOUBLE HULL OIL TANKER – Areas subject to close-up survey and thickness measurements – areas (1) to (5) as defined in Table I of Annex “C”
Close-up survey and thickness measurement
DOUBLE HULL OIL TANKER – Areas subject to close-up survey and thickness measurements – areas (6) to (7) as defined in Table I of Annx “C”
(a) Single Deck Ship

- Side shell frames and end brackets
- Transverse bulkhead
- Double bottom tank

(b) Tween Deck Ship

- General dry cargo ships
- Close-up survey and thickness measurement
General dry cargo ships Close-up survey and thickness measurement areas
Close-up survey and thickness measurement
DOUBLE SKIN BULK CARRIERS - Typical transverse section indication longitudinal and transverse members