



# Pacific Register of Ships

## Rules for the Classification of Vessels

### **Part B**

### Surveys

2008

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These Rules have a date of coming into effect of 1 January 2008.

## CONTENTS

CHAPTER 1	MAINTAINANCE OF CLASS.....	1
1.1	General principles of surveys .....	1
1.2	Appointment of another Surveyor.....	3
1.3	Definitions and procedures related to surveys .....	4
1.4	Class renewal survey .....	10
1.5	Other periodical surveys.....	13
1.6	Occasional surveys .....	16
1.7	Lay-up and re-commissioning .....	18
1.8	Surveys Carried Out by the Chief Engineer .....	19
1.9	Thickness Measurements: Extent, Determination of Locations, Acceptance Criteria .....	22
CHAPTER 2	SCOPE OF ANNUAL SURVEYS (ALL VESSELS) .....	24
2.1	General.....	24
2.2	Hull .....	24
2.3	Machinery and systems.....	27
2.4	Safety management system.....	31
CHAPTER 3	SCOPE OF INTERMEDIATE SURVEYS (ALL VESSELS) .....	32
3.1	General.....	32
3.2	Hull .....	32
CHAPTER 4	SCOPE OF CLASS RENEWAL SURVEY (ALL VESSELS) .....	34
4.1	General.....	34
4.2	Hull and equipment.....	34
4.3	Machinery and systems.....	39
CHAPTER 5	SCOPE OF BOTTOM SURVEY (ALL VESSELS).....	50
5.1	General.....	50
5.2	Bottom survey in dry condition .....	50
5.3	Bottom in-water survey.....	51
CHAPTER 6	SCOPE OF TAILSHAFT SURVEY (ALL VESSELS).....	53
6.1	Survey of tailshafts .....	53
6.2	Periodical survey of other propulsion systems .....	53
CHAPTER 7	SCOPE OF BOILER SURVEY (ALL VESSELS).....	56
7.1	General.....	56
7.2	Steam boilers.....	56
7.3	Thermal oil heaters.....	57

## CHAPTER 1 MAINTAINANCE OF CLASS

### 1.1 GENERAL PRINCIPLES OF SURVEYS

#### 1.1.1 Survey types

##### 1.1.1.1 *Periodical surveys*

Classed vessels are submitted to surveys for the maintenance of class. These surveys include the class renewal survey, intermediate and annual survey, bottom survey (either survey in dry condition or in-water survey), tail shaft survey, boiler survey, and surveys for the maintenance of additional class notations, where applicable. Such surveys are carried out at the intervals and under the conditions laid down in this Part.

The different types of periodical surveys are summarised in Table 1. The intervals at which the periodical surveys are carried out are given in the items referred to in the second column of Table 1. The relevant extent and scope of each survey is given later in this chapter.

**Table 1 — List of periodical surveys**

Type of survey	Reference to period of survey	Reference to scope of survey
Class renewal - hull		4.2
Class renewal - machinery		4.3
Class renewal - additional class notations		
Annual - hull	1.5.2	2.2
Annual - machinery		2.3
Annual - additional class notations		
Intermediate - hull	1.5.3	3.2
Intermediate - machinery		
Bottom - dry condition	1.5.4	5.2
Bottom - in water		5.3
Tailshaft - complete	1.5.5	Chapter 6
Boiler - complete	1.5.7	Chapter 7

Notes:

1. As applicable, according to the service notation assigned to the vessel
2. As applicable, according to the additional class notations assigned to the vessel

##### 1.1.1.2 *Occasional surveys*

In addition to the periodical surveys in clause 1.1.1.1, vessels are to be submitted to occasional surveys whenever the circumstances so require.

##### 1.1.1.3 *Additional notations*

Where there are no specific survey requirements for additional class notations assigned to a vessel, equipment and/or arrangements related to

these additional class notations are to be examined, as applicable, to the Surveyor's satisfaction at each class renewal survey for the class.

#### **1.1.1.4 Non-compliances**

Where the conditions for the maintenance of the class, service notations and additional class notations are not complied with, the class and/or the service notation and/or the additional class notations as appropriate will be suspended and/or withdrawn in accordance with the applicable Rules.

Note:

It is understood that requirements for surveys apply to those items that are required according to the Rules or, even if not required, are fitted on board.

#### **1.1.1.5 Partial surveys**

Unless specified otherwise, any survey other than bottom survey and tail shaft survey may be affected by carrying out partial surveys at different times to be agreed upon with the Society, provided that each partial survey is adequately extensive. The splitting of a survey into partial surveys is to be such as not to impair its effectiveness.

#### **1.1.1.6 Surveyors satisfaction**

The surveys are to be carried out in accordance with the relevant requirements in order to confirm that the hull, machinery, equipment and appliances are to the satisfaction of the surveyor.

### **1.1.2 Change of periodicity, postponement or advance of surveys**

#### **1.1.2.1 Variations in period**

The Society reserves the right, after due consideration, to change the periodicity, postpone or advance surveys, taking into account particular circumstances.

#### **1.1.2.2 Due dates when at sea**

When a survey becomes overdue during a voyage, the following applies:

- a) In the case of a class renewal survey, the Society may, under exceptional circumstances, grant an extension to allow for completion of this survey provided there is documented agreement to such an extension prior to the expiry date of the Certificate of Classification, adequate arrangements have been made for the attendance of the Surveyor at the first port of call and the Society is satisfied that there is technical justification for such an extension. Such an extension will be granted only until arrival at the first port of call after the expiry date of the Certificate of Classification.
- b) In the case of annual and intermediate surveys, no postponement is granted. Such surveys are to be completed within their prescribed windows; see Figure 2.
- c) In the case of all other periodical surveys and Conditions of Class, extension of class may be granted until the arrival of the vessel at the port of destination.

### **1.1.3 Extension of scope of survey**

#### **1.1.3.1**

The Society and/or its Surveyors may extend the scope of the provisions in these rules, which set forth the technical requirements for surveys, whenever and so far as considered necessary, or modify them in the case of special vessels or systems.

#### **1.1.3.2**

The extent of any survey depends upon the condition of the vessel and its equipment. Should the Surveyor have any doubt as to the maintenance or condition of the vessel or its equipment, or be advised of any deficiency or damage which may affect the class, then further examination and testing may be conducted as considered necessary.

### **1.1.4 General procedure of survey**

#### **1.1.4.1**

The general procedure of survey consists of the following:

- a) an overall examination of the parts of the vessel covered by the rule requirements,
- b) checking selected items covered by the rule requirements,
- c) attending tests and trials where applicable and deemed necessary by the Surveyor.

#### **1.1.4.2**

When a survey results in the identification of significant corrosion, structural defects or damage to hull, machinery and/or any piece of its equipment which, in the opinion of the Surveyor, affect the vessel's class, remedial measures are to be implemented before the vessel continues in service.

Notes:

1. The Society's survey requirements cannot be considered as a substitute for specification and acceptance of repairs and maintenance, which remain the responsibility of the Owner.
2. The Society will, at the request of the Owner, apply the regulations of Administrations concerning the scope and periodicity of surveys when they differ from those laid down in these rules.
3. During the surveys, the Surveyor does not check that the spare parts are kept on board, maintained in working order and suitably protected and lashed.

## **1.2 APPOINTMENT OF ANOTHER SURVEYOR**

Should a disagreement arise between the Owner and the Surveyor during a survey, the Society may, at the request of the Owner, designate another Surveyor.

## **1.3 DEFINITIONS AND PROCEDURES RELATED TO SURVEYS**

### **1.3.1 General**

#### **1.3.1.1 *Period of class***

Period of class means the period starting either from the date of the initial classification or from the credited date of the last class renewal survey, and expiring at the limit date assigned for the next class renewal survey.

#### **1.3.1.2 *Anniversary date***

Anniversary date means the day of the month of each year in the period of class, which corresponds to the expiry date of the period of class.

#### **1.3.1.3 *Survey time window***

Survey time window, or more simply window, means the fixed period during which annual and intermediate surveys are to be carried out.

#### **1.3.1.4 *Overdue surveys***

Each periodical survey is assigned a limit date specified by the relevant requirements of the Rules (end of survey interval or end date of window) by which it is to be completed.

A survey becomes overdue when it has not been completed by its limit date.

#### **1.3.1.5 *Condition of Class***

Any defect and/or deficiency affecting the class and to be dealt with within a specific period of time is indicated as a Condition of Class. A Condition of Class is pending until it is cleared. Where it is not cleared by its limit date, the condition is overdue.

#### **1.3.1.6 *Memoranda***

Those defects and/or deficiencies which do not affect the maintenance of class and which may therefore be cleared at the Owner's convenience and any other information deemed noteworthy for the Society's convenience are indicated as memoranda. Memoranda are not to be regarded as Conditions of Class.

### **1.3.2 Terminology related to hull survey**

#### **1.3.2.1 *Ballast tank***

A ballast tank is a tank, which is used solely for salt-water ballast. A tank which is used for both cargo and salt water ballast will be treated as a ballast tank when substantial corrosion has been found in such tank.

#### **1.3.2.2 *Spaces***

Spaces are separate compartments including holds and tanks.

**1.3.2.3 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.

**1.3.2.4 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.

**1.3.2.5 Transverse section**

A transverse section includes all longitudinal members contributing to longitudinal hull girder strength, such as plating, longitudinals and girders at the deck, sides, bottom, inner bottom, longitudinal bulkheads and, as applicable for the different vessel types, relevant longitudinals, hopper side plating, bottom plating in top wing tanks. For a transversely framed vessel, a transverse section includes adjacent frames and their end connections in way of transverse sections.

**1.3.2.6 Representative tanks or spaces**

Representative tanks or spaces are those, which are expected to reflect the condition of other tanks or spaces of similar type and service and with similar corrosion protection systems. When selecting representative tanks or spaces, account is to be taken of the service and repair history on board and identifiable Critical Structural Areas and/or Suspect Areas.

**1.3.2.7 Substantial corrosion**

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

**1.3.2.8 Suspect areas**

Suspect areas are locations showing substantial corrosion and/or considered by the Surveyor to be prone to rapid wastage.

**1.3.2.9 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 vessel or from similar or sister vessels (if available) to be sensitive to cracking, buckling, yielding or corrosion which would impair the structural integrity of the vessel.

**1.3.2.10 Coating**

A corrosion prevention system is normally considered either:

- a) a full hard coating, or
- b) a full hard coating supplemented by anodes.

Protective coatings are to usually be epoxy coating or equivalent. Other coating systems may be considered acceptable as alternatives provided

that they are applied and maintained in compliance with the coating Manufacturer's specifications.

#### **1.3.2.11 Coating condition**

Coating condition is defined in Table 2.

**Table 2 — Corrosion condition description**

Designation	Description
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

#### **1.3.2.12 Cargo area (vessels carrying liquid cargo in bulk)**

The cargo area is that part of the vessel 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 vessel over the above-mentioned spaces.

#### **1.3.2.13 Cargo area (dry cargo vessels)**

The cargo area is that part of the vessel, which includes all cargo holds, and adjacent areas including fuel tanks, cofferdams, ballast tanks and void spaces.

#### **1.3.2.14 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.

### **1.3.3 Procedures for thickness measurements**

#### **1.3.3.1 Responsibility**

When required as per the scope of surveys defined in clause 1.9, thickness measurements are normally to be carried out under the responsibility of the Owner, in the presence of the Surveyor.

#### **1.3.3.2 Inspection**

For all vessels thickness measurements required in the context of surveys of hull structure is to be witnessed by a Surveyor. This requires the Surveyor to be on board while the gauging is being carried out.

#### **1.3.3.3 Authorisation**

The thickness measurements can be carried out by a company authorised by the Society or by the surveyor. When an approved company takes the thickness measurements, the report is to be validated by the Surveyor.

The Society reserves the right to limit the scope of authorisation of the Company.

#### **1.3.3.4 Calibration**

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. Where doubt exists as to the accuracy of the measuring equipment, it is to be recalibrated before any results can be accepted.

#### **1.3.3.5 Thickness measurement report**

A thickness measurement report is to be prepared. The report is to give the location of measurements, the thickness measured and the corresponding original thickness. Furthermore, the report is to include the date when the measurements were carried out, the type of measuring equipment, the names and the qualification of the operators and their signatures.

### **1.3.4 Agreement of firms for in-water survey**

#### **1.3.4.1**

The in-water surveys referred to in the Rules are to be carried out by a certified company accepted by the Society.

### **1.3.5 Preparations and conditions for surveys**

#### **1.3.5.1 Owners responsibility**

The Owner is to provide the necessary facilities for the safe execution of the surveys.

#### **1.3.5.2 Cleanliness and illumination**

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

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

Sufficient illumination is to be provided to reveal significant corrosion, deformation, fractures, damages or other structural deterioration.

#### **1.3.5.3 Entry permit**

A tank entry permit is to be issued prior to entering the tank. Adequate ventilation is to be maintained during the survey, and the required ventilation is to be specified on the entry permit. If the tanks are

connected by a common venting system or an IG system, the tank inspected is to be isolated to prevent a transfer of gas from other tanks.

#### **1.3.5.4 Communication**

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

#### **1.3.5.5 Equipment**

Gas Analysers, breathing apparatus, lifelines and whistles are to be at hand during the survey.

#### **1.3.5.6 Coverings and coatings**

When examination of hidden structure is required, the following applies:

- a) ceilings in holds and floors in the engine room are to be lifted to the necessary extent for examination of the structure
- b) cement or other protective sheathing is to be removed when there is any doubt as to the condition of the plating underneath or when adherence to plating is not tight
- c) in the case of solid ballast spaces, the solid ballast is to be partially removed for examination of the condition of the structure in way to the satisfaction of the Surveyor.
- d) insulation of compartments intended for refrigerated cargoes is to be removed over the necessary extent for examination by the Surveyor of the condition of the structure, unless constructional arrangements make such inspections possible without removing the insulation
- e) where soft 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 coating is to be removed.

### **1.3.6 Access to structures**

#### **1.3.6.1 Overall inspection**

For overall survey, means are to be provided to enable the Surveyor to examine the hull structure in a safe and practical way.

#### **1.3.6.2 Close-up inspection**

For close-up survey, one or more of the following means for access, acceptable to the Surveyor, is to be provided:

- a) permanent staging and passages through structures
- b) temporary staging and passages through structures
- c) lifts and moveable platforms
- d) boats or rafts
- e) other equivalent means.

### **1.3.7 Equipment for surveys**

#### **1.3.7.1 Fracture detection**

One or more of the following fracture detection procedures may be required if deemed necessary by the Surveyor:

- a) radiographic equipment
- b) ultrasonic equipment
- c) magnetic particle equipment
- d) dye penetrant

### **1.3.8 Surveys at sea and anchorage**

#### **1.3.8.1**

Surveys at sea or at anchorage may be accepted provided the Surveyor is given the necessary assistance by the personnel on board and all precautions are to the surveyor's satisfaction.

### **1.3.9 Repairs and maintenance during voyage**

#### **1.3.9.1**

Where repairs to hull, machinery or other equipment, which affect or may affect the class, 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 the Society for approval sufficiently in advance. Failure to notify the Society in advance of the repairs may result in the suspension of class of the vessel.

#### **1.3.9.2**

The requirement in clause 1.3.9.1 is not intended to include maintenance to and overhaul of the hull, machinery and equipment in accordance with the Manufacturer's recommended procedures and established marine practice, which does not require the Society's agreement. However, any repair resulting from such maintenance and overhauls, which affects or may affect the class is to be noted in the vessel's log and submitted to the attending Surveyor for use in determining further survey requirements.

### **1.3.10 Repairs**

#### **1.3.10.1**

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 repaired.

Areas to be considered include, as applicable for the different vessel types:

- a) side structure and side plating; side shell frames, their end attachments or adjacent shell plating; inner side structure and inner side plating
- b) deck structure and deck plating
- c) bottom structure and bottom plating; inner bottom structure and inner bottom plating
- d) longitudinal bulkheads structure and longitudinal bulkheads plating, where fitted
- e) transverse watertight or oil-tight bulkheads structure and plating, and
- f) hatch covers or hatch coamings.

#### **1.3.10.2**

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

#### **1.3.10.3**

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

### **1.3.11 Status of surveys and recommendations**

#### **1.3.11.1**

Information given in the Certificate of Classification, associated endorsements, Rules and specific documents enables the Owner to identify the status of surveys and Conditions of Class.

#### **1.3.11.2**

The omission of such information does not absolve the Owner from ensuring that surveys are held by the limit dates and pending recommendations are cleared to avoid any inconvenience which is liable to result from the suspension or withdrawal of class.

## **1.4 CLASS RENEWAL SURVEY**

### **1.4.1 General principles**

#### **1.4.1.1**

Class renewal surveys are to be carried out at five-year intervals. However, consideration may be given by the Society to granting an extension for a maximum of three months after the limit date, in exceptional circumstances. In such cases the next period of class will start from the limit date for the previous class renewal survey before the extension was granted.

#### 1.4.1.2

For surveys completed within three months before the limit date of the class renewal survey, the next period of class will start from this limit date. For surveys completed more than three months before the limit date, the period of class will start from the survey completion date.

#### 1.4.1.3

A new period of class is assigned to the vessel after the satisfactory completion of the class renewal survey, and a new Certificate of Classification with relevant annexes is issued for the new period of class.

### 1.4.2 Normal survey system

#### 1.4.2.1

When the normal survey system is applied, the class renewal survey may be commenced at the fourth annual survey and continued during the following year with a view to completion by its due date. In this case the survey may be carried out by partial surveys at different times. The number of checks to be performed at each partial survey and the interval between partial surveys are to be agreed by the Society.

#### 1.4.2.2

A class renewal survey may be commenced before the fourth annual survey at the request of the Owner. In this case, the survey is to be completed within fifteen months. The conditions for the execution of partial surveys are the same as those referred to above in clause 1.4.2.1.

### 1.4.3 Continuous survey system

#### 1.4.3.1

The request by the Owner for admission to the continuous survey system will be considered by the Society and agreement depends on the type and age of hull and machinery. This system may apply to the class renewal survey of hull (**CSH**), machinery (**CSM**).

#### 1.4.3.2

The continuous survey system is not applicable to the class renewal survey of the hull of those vessels subject to the Enhanced Survey Program (**ESP**), i.e. vessels with the service notation **oil tanker**, **combination carrier**, **bulk carrier**, **ore carrier** or **chemical tanker**.

#### 1.4.3.3

For vessels other than those referred to in clause 1.4.3.1, the continuous survey system is generally not applicable to the class renewal survey of the hull of vessels over 20 years old. However, consideration may be given, at the discretion of the Society, to the applicability of the continuous survey system to the class renewal survey of the hull of these vessels.

**1.4.3.4**

When the continuous survey system is applied, this is indicated in the Certificate of Classification and appropriate notations as indicated in clause 1.4.3.1 are entered in the Register of Vessels.

**1.4.3.5**

Vessels subject to the continuous survey system are provided with lists of items to be surveyed under this system; these lists are attached to the Certificate of Classification.

**1.4.3.6**

For items inspected under the continuous survey system, the following requirements generally apply:

- a) the interval between two consecutive surveys of each item is not to exceed five years
- b) the items are to be surveyed in rotation, so far as practicable ensuring that approximately equivalent portions are examined each year
- c) the Society may credit for continuous survey results of inspections carried out before the admission to the continuous survey scheme
- d) each item is to be surveyed at one time, as far as practicable; the Society may, however, allow possible repair work to be carried out within a certain period.

**1.4.3.7**

For vessels under continuous survey, items not included in the continuous survey cycle are to be inspected according to the provisions given in clause 1.4.2. Bottom surveys are to be carried out according to the requirements of clause 1.5.4. In addition, the bottom survey, which is to be carried out in conjunction with, the end of class period is to be performed within 15 months before the end of this class period.

**1.4.3.8**

Upon application by the Owner, the Society may agree, subject to certain conditions, that the vessel's Chief Engineer examines some items of machinery, which are included in the continuous survey cycle, where the Society is not represented. The Chief Engineer is to be certified for this purpose by the Society and his examination is to be followed by a confirmatory survey carried out by a Surveyor. The conditions for the application of this procedure are given in these rules.

**1.4.3.9**

The continuous survey system does not supersede the annual surveys and other periodical and occasional surveys.

**1.4.3.10**

A general examination of the vessel, as detailed for annual surveys, is to be carried out at the end of the period of class.

**1.4.3.11**

For laid-up vessels, specific requirements given in clause 1.7.1 apply.

**1.4.3.12**

The continuous survey system may be discontinued at any time at the discretion of the Society, or at the request of the Owner, and a specific arrangement devised.

**1.5 OTHER PERIODICAL SURVEYS****1.5.1 General**

The different types of periodical surveys are summarised in Table 1.

**1.5.2 Annual surveys**

Annual surveys are to be carried out within three months before or after each anniversary date.

**1.5.3 Intermediate surveys****1.5.3.1**

An intermediate survey, where applicable, is to be carried out within the window from three months before the second to three months after the third anniversary date.

**1.5.3.2**

The intermediate survey is applicable to vessels with the service notations **oil tanker, chemical tanker, FLS tanker, liquefied gas carrier, combination carrier/OBO and combination carrier/OOC.**

**1.5.3.3**

The intermediate survey is applicable at any period of class to vessels other than those indicated in clause 1.5.3.2 which are five years old and over.

**1.5.4 Bottom survey****1.5.4.1**

Bottom survey means the examination of the outside of the vessel's bottom and related items. This examination may, under certain circumstances, be carried out with the vessel either in dry dock (or on a slipway) or afloat: in the former case the survey will be referred to as dry-docking survey, while in the latter case as in-water survey.

**1.5.4.2**

The Owner is to notify the Society whenever the outside of the vessel's bottom and related items can be examined in dry dock or on a slipway.

### 1.5.4.3

The outside of the vessel's bottom and related items are to be examined on two occasions in any five-year period. The periodicity of the bottom survey is two years and six months (2.5 years).

Note:

Attention is drawn to the relevant requirements concerning application of national and international regulations.

### 1.5.4.4

One of the two bottom surveys to be performed in each five-year period is to be concurrent with the class renewal survey and is to be a dry-docking survey.

### 1.5.4.5

The Society may allow the bottom survey carried out between class renewal surveys to be replaced by an in-water survey. Special consideration, however, is given to vessels of 15 years of age and over prior to granting such permission.

### 1.5.4.6

The interval between examinations of the outside of the vessel's bottom and related items for vessels operating in fresh water and for certain harbour or non-self-propelled craft may be greater than that given above, as approved by the Society.

## 1.5.5 Tail shaft survey

### 1.5.5.1 Definition

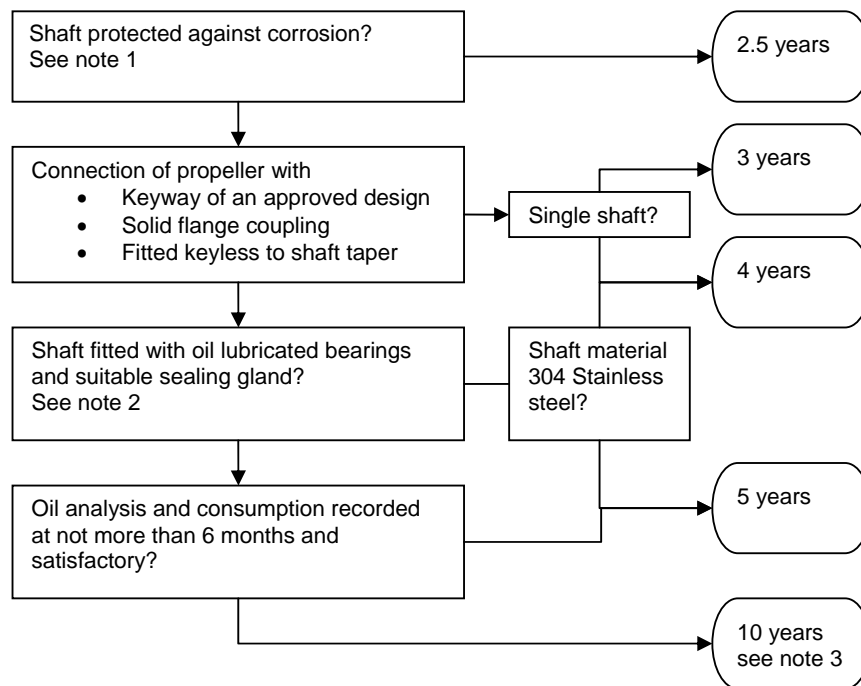
Tail shaft survey means survey of propeller shafts and tube shafts (hereafter referred to as tail shafts) as well as survey of other propulsion systems.

### 1.5.5.2 Tail shaft complete survey

Tail shafts are to be submitted to complete examination at the periodicity specified below and summarised in Figure 1. This is based on the type of shaft and its design.

- a) Where the tail shaft is fitted with continuous liners, or approved oil sealing glands, or made of corrosion-resistant material, the periodicity of complete surveys is:
  - i) 3 years for single shafting arrangements
  - ii) 4 years for multi-shafting arrangements.
- b) These periodicities may be increased to 5 years in the following cases:
  - i) where the propeller is fitted keyless to the shaft taper, the shaft is protected from sea water, the design details are approved, and a non-destructive examination of the forward part of the aft shaft taper is performed at each survey by an approved crack-detection method

- ii) where the propeller is fitted to a keyed shaft taper the design details of which comply with the applicable requirements, and a non-destructive examination 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 is performed at each survey by an approved crack-detection method
- iii) 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, and a non-destructive examination of the after flange fillet area of the shaft is performed at each survey by an approved crack-detection method
- c) In all other cases the periodicity of complete surveys is two years and six months (2.5 years).
- d) with shaft withdrawn, subject to modified survey at 5 years
- e) with shaft in place, subject to modified survey at 5 years



#### Notes

- Shafts protected against corrosion are those:
  - made of corrosion resistant material, or
  - fitted with continuous liners or systems considered as equivalent, or
  - fitted with oil lubricated bearings and oil sealing glands.
- Suitable sealing glands are glands which are type approved by the Society with regard to protection of the stern tube against ingress of water.
- Shaft withdrawn, subject to modified survey at 5 years

**Figure 1 – Tail-shaft Survey Schedules**

### 1.5.6 Other propulsion systems

Driving components serving the same purpose as the tail shaft in other propulsion systems, such as directional propellers, vertical axis propellers, water jet units, dynamic positioning systems and thrusters assisted mooring systems, are to be submitted to periodical surveys at intervals not exceeding five years.

### 1.5.7 Boiler survey

#### 1.5.7.1

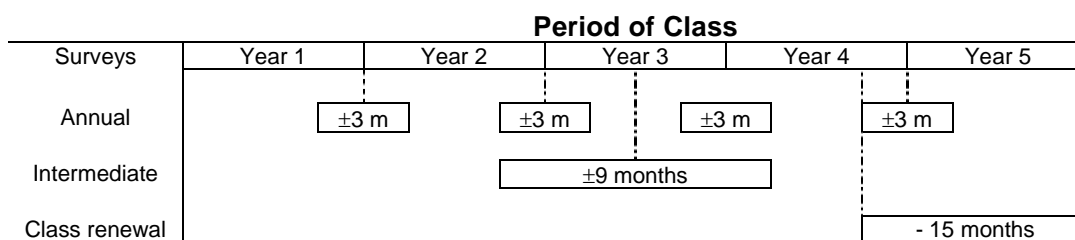
Boilers and thermal oil heaters are to be surveyed twice in every five-year period. The periodicity of the boiler survey is two years and six months (2.5 years).

#### 1.5.7.2

Boilers are also submitted to an external inspection as a part of the annual survey of machinery.

### 1.5.8 Links between anniversary dates and annual surveys, intermediate surveys and class renewal surveys

The link between the anniversary dates, the class renewal survey (when carried out according to the normal system), and the annual and intermediate surveys is given in Figure 2.



**Figure 2 – Timeline for anniversary date, annual, intermediate and class renewal surveys**

## 1.6 OCCASIONAL SURVEYS

### 1.6.1 General

#### 1.6.1.1

An occasional survey is any survey, which is not a periodical survey. The survey may be defined as an occasional survey of hull, machinery, boilers, refrigerating plants, etc., depending on the part of the vessel concerned.

Where defects are found, the Surveyor may extend the scope of the survey as deemed necessary.

#### 1.6.1.2

Occasional surveys are carried out at the time of, for example:

- a) updating of classification documents (e.g. change of the Owner, name of the vessel, flag)
- b) damage or suspected damage
- c) repair or renewal work
- d) Port State Control inspections
- e) alterations or conversion
- f) quality system audits
- g) Postponement of surveys or recommendations.

## **1.6.2 Damage and repair surveys**

### **1.6.2.1**

In the event of damage, which affects or may affect the class of the vessel, the Owner is to apply to the Society for a survey. Such application is to be made as soon as possible to enable the Surveyor to ascertain the extent of the damage and necessary repairs, if any.

Note:

Whenever a vessel is fitted with a helicopter platform which is made in aluminium or other low melting metal construction which is not made equivalent to steel, and a fire occurred on the said platform or in close proximity, the platform is to be subject to a structural survey to determine its suitability for further use.

### **1.6.2.2**

If, after sustaining damage, the vessel calls at a port where the Society is not represented, the Owner is to notify the Society forthwith, supply all available information regarding the damage and make arrangements for the vessel to be surveyed in the nearest port where the Society is represented.

### **1.6.2.3**

All repairs to hull, machinery and equipment, which may be required in order for a vessel to retain its class, are to be to the satisfaction of the Surveyor.

During repairs or maintenance work, the Owner is to arrange so that any damage, defects or non-compliance with the rule requirements are reported to the Surveyor during his survey.

### **1.6.2.4**

Damages and partial or temporary repairs considered acceptable by the Surveyor for a limited period of time are the subject of an appropriate Condition of Class.

### **1.6.2.5**

Damages or repairs required by the Surveyor that are to be re-examined after a certain period of time are the subject of an appropriate Condition of Class.

### **1.6.3 Conversions, alterations and repairs**

#### **1.6.3.1**

Conversions, alterations or repairs of/to structures and arrangements affecting the class are to be carried out in accordance with the requirements of the Society and to its satisfaction. Where necessary, documentation is to be submitted to the Society and/or made available to the attending Surveyor.

#### **1.6.3.2**

Materials and equipment used for conversions, alterations or repairs are generally to meet the requirements of the Rules for new vessels built under survey.

### **1.7 LAY-UP AND RE-COMMISSIONING**

#### **1.7.1 General principles**

##### **1.7.1.1**

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

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

##### **1.7.1.2**

The lay-up maintenance program provides for a "laying-up survey" to be performed at the beginning of lay-up and subsequent "annual lay-up condition surveys" to be performed in lieu of the normal annual surveys which are no longer required to be carried out as long as the vessel remains laid-up. The other periodical surveys which become overdue during the lay-up period may be postponed until the re-commissioning of the vessel.

##### **1.7.1.3**

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

##### **1.7.1.4**

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

**1.7.1.5**

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

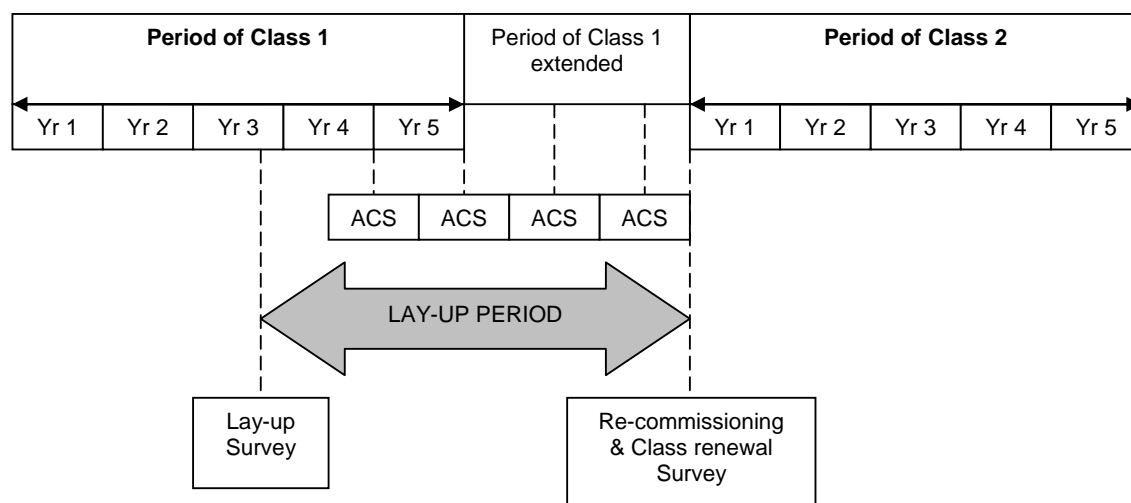
- a) an occasional survey prior to re-commissioning, the scope of which depends on the duration of the lay-up period
- b) all periodical surveys which have been postponed.

**1.7.1.6**

Where the previous period of class expired before the re-commissioning and was extended, complete class renewal survey is to be carried out prior to re-commissioning. Those items, which have been surveyed in compliance with the class renewal survey requirements during the 15 months preceding the re-commissioning, may be credited. A new period of class is assigned from the completion of this class renewal survey.

**1.7.1.7**

The intervals or limit dates for surveys to be carried out during the lay-up period are summarised in Figure 3.



Note:

A. C. S. means annual lay-up condition survey.

**Figure 3 – Survey scheme of a case of a lay-up going beyond the expiry date of the period of class**

**1.8 SURVEYS CARRIED OUT BY THE CHIEF ENGINEER****1.8.1 General**

The basic conditions for the acknowledgment of surveys carried out by Chief Engineers are specified hereafter. Consideration may be given to other conditions on a case by case basis.

**1.8.1.1**

The Chief Engineer must be a permanent employee of the Company. When the Company applies for the appointment of a Chief Engineer with

the Society for the first time, he must have been working in this position for a reasonable period of time or have possessed the recognition of the Society for another Company by which he was employed.

He must hold a certificate of competency as provided by STCW 95 Convention for the power of the main propulsive installation of the vessel. He must have at least three years of seagoing experience as Senior Engineer Officer on vessels of the type (motor or steam vessel) for which the authorisation is requested. The authorisation may be given for both the propelling systems.

#### **1.8.1.2**

The Owner is to submit a written application to the Society requesting the authorisation of a Chief Engineer together with his curriculum vitae, providing in particular:

- a) name(s) and surname
- b) date of birth
- c) professional certificates with date of issue
- d) appointment date in the Company and, if applicable, reference to preceding authorisation(s) obtained from the Society when employed in other Companies (number, date, period)
- e) list of the different appointments since the acquisition of the certificate, specifying the names of vessels with their types of propulsion, the period of each appointment and the rank in each appointment
- f) technical training and courses.

The Owner is to keep the Society informed about any changes concerning the Chief Engineers employed with his Company due to resignations, alternations, etc.

#### **1.8.1.3**

If the application for the recognition of the Chief Engineer is accepted, the Society sends a "Letter of authorisation" to the Owner, who will arrange to forward it to the Chief Engineer in question. This letter allows him to carry out the survey of the machinery items when the CMS system, is implemented on board vessels, in accordance with the requirements.

The Owner is also to provide the Chief Engineer with a copy of these rules, enabling him to familiarise himself with the conditions, scope and limits of his surveys.

The authorisation ceases to be valid when the Chief Engineer leaves the Company

## **1.8.2 Extent of Survey**

### **1.8.2.1**

For vessels where the CMS system is implemented, the Chief Engineer cannot inspect the following items of the class renewal survey for machinery:

- a) pressure vessels
- b) main and auxiliary turbines
- c) main reduction gears
- d) crankshafts, with associated main bearings and bottom end connecting rod bearings, of main propulsion internal combustion engines. However, the Chief Engineer may inspect bottom end connecting rod bearings of diesel engines having trunk pistons when the complete associated cylinder is inspected in the course of the engine maintenance program
- e) turbochargers of main propulsion internal combustion engines
- f) intermediate shafting and associated bearings
- g) steering gear system, including pumps.

All the items surveyed under a continuous survey programme are to be inspected once by the Society's Surveyors within a 10-year cycle.

The attention of Chief Engineers is drawn to the fact that surveys performed by them in ports, which are under the jurisdiction of an office of the Society or during very short voyages between ports where Surveyors of the Society are available, will not be credited.

### **1.8.2.2**

In no case can the surveys of tailshafts and boilers, which are items not included in the scope of the class renewal survey, be carried out by the Chief Engineer.

## **1.8.3 Confirmatory survey**

### **1.8.3.1 Time for survey**

A confirmatory survey, to be carried out by a Surveyor of the Society, is to be requested for vessels under the CMS system, within a reasonably short time from the date of the surveys carried out by the Chief Engineer, and, in any case, in the first port which is under the jurisdiction of an Office of the Society.

### **1.8.3.2**

The Surveyor is to be supplied with a copy of this survey report and also shown the engine log-book.

### **1.8.3.3**

The Surveyor carries out an external examination of the relevant items and replaced parts, checks records and, if applicable, attends running

tests. If doubts arise, the Surveyor may request dismantling as deemed necessary.

#### **1.8.3.4**

Where the confirmatory survey is performed with an abnormal delay, the inspection is to be more extensive and, if necessary, the due surveys are to be completely repeated.

#### **1.8.3.5 Date of survey**

The date of the execution of the surveys will be assumed to be the date of the confirmatory survey.

#### **1.8.4 Suspension of the Chief Engineer's authorisation**

Where the condition of the items surveyed by the Chief Engineer as specified in his reports does not correspond to the findings of the attending Surveyor, the Society may suspend the validity of the Chief Engineer's authorisation.

### **1.9 THICKNESS MEASUREMENTS: EXTENT, DETERMINATION OF LOCATIONS, ACCEPTANCE CRITERIA**

#### **1.9.1 General**

Thickness measurements are a major part of surveys to be carried out for the maintenance of class, and the analysis of these measurements is a prominent factor in the determination and extent of the repairs and renewals of the vessel's structure. Prior to the survey the programme for thickness measurement must be submitted by the owner for approval.

#### **1.9.2 Rule requirements for the extent of measurements**

##### **1.9.2.1 Class renewal survey of all vessels with the exception of those submitted to ESP:**

The thickness measurements required by the Rules consist of:

- a) systematic thickness measurements, i.e. measurements of different parts of the structure in order to assess the overall and local strength of the vessel,
- b) measurements of suspect areas,
- c) additional measurements on areas determined by the attending surveyor or the Society.

##### **1.9.2.2 Class renewal survey of vessels submitted to ESP or equivalent survey:**

The thickness measurements required by the Rules consist of:

- a) systematic thickness measurements in order to assess the overall and local strength of the vessel
- b) thickness measurements as indicated in the program of close-up survey
- c) measurements of elements considered as suspect areas

- d) additional measurements on areas determined as affected by substantial corrosion.

## CHAPTER 2 SCOPE OF ANNUAL SURVEYS (ALL VESSELS)

### 2.1 GENERAL

#### 2.1.1 Application

The requirements of this chapter apply to annual surveys of all vessels.

#### 2.1.2 Scope

At the time of annual surveys, the vessel is to be generally examined. The survey is to include a visual inspection of the hull, equipment and machinery of the vessel and some tests thereof, so far as necessary and practicable in order to verify that the vessel is in an acceptable general condition and is properly maintained.

#### 2.1.3 Modifications

Owners are reminded that any modification to the vessel's hull, equipment and machinery affecting its classification is to be made known to the Society.

### 2.2 HULL

#### 2.2.1 Hull and hull equipment

##### 2.2.1.1

The survey is to include a general external examination and testing, where appropriate, of the following items, as applicable:

- a) outer shell plating above the waterline, relevant shell doors and accessible parts of the rudder(s)
- b) plating of freeboard deck and exposed decks, superstructures, with their openings and means of closure
- c) cargo hatchways and other openings on exposed decks, with their coamings and their means of closure and securing arrangements (for details see clause 2.2.2)
- d) sidescuttles and deadlights, chutes and other openings with their means of closure
- e) bulwarks, guard rails, freeing ports, gangways and lifelines, ladders
- f) scuppers and sanitary discharges, valves on discharge lines and their controls
- g) ventilators, air pipes, overflow pipes and gas vent pipes, with their means of closure and flame screens, where required
- h) fittings and appliances for timber deck cargoes, where applicable
- i) freeboard marks on the vessel's sides
- j) deck equipment such as lifeboat davit foundations, bollards, fairleads, hawse pipes, etc., masts and associated rigging, including lightning conductors
- k) windlass and equipment of chain cables or wire ropes for anchors,

- l) watertight bulkheads, their watertight doors and associated local and remote controls, and their watertight penetrations
- m) main and auxiliary steering arrangements, including their associated equipment and control systems, and manoeuvring gear
- n) fire divisions and fire doors, dampers in ventilation ducts, means of closure of skylights and other openings
- o) confirmation that emergency escape routes from accommodation and service spaces are satisfactory
- p) accessible cargo holds, in particular in areas likely to be damaged by cargo handling
- q) confirmation that the drainage from enclosed cargo spaces situated on the freeboard deck is satisfactory
- r) engine room
- s) where fitted, helicopter deck and its supporting structure, safety net and arrangements for the prevention of sliding
- t) availability of loading manual or, where required, electronic loading instrument, including standard test
- u) availability of approved stability documentation.

Note:

Due attention is also to be given to fuel oil piping passing through ballast tanks, which is to be pressure tested where doubts arise.

### **2.2.1.2**

Suspect areas identified at previous class renewal surveys are to be examined. Areas of substantial corrosion identified at previous class renewal or intermediate surveys are to be subjected to thickness measurements.

### **2.2.1.3**

Ballast tanks are to be internally examined when required as a consequence of the results of the class renewal survey (see clause 4.2.4.2), or the intermediate survey (see Table 3).

Thickness measurements are to be carried out as considered necessary by the Surveyor.

## **2.2.2 Hatch covers and coamings**

### **2.2.2.1 Owners Declaration**

The Owner or his representative is to declare to the attending Surveyor that no significant changes have been made to the hatch covers, hatch coamings and their securing and sealing devices without prior approval of the Society.

### **2.2.2.2 General**

The annual survey should consist of an examination for the purpose of ensuring, as far as practicable, that the hull hatch covers, coamings and piping are maintained in a satisfactory condition and should take into account the service history, condition and extent of the corrosion

prevention system of ballast tanks and areas identified in the survey report file.

The survey of hatch covers and coamings is to include:

- a) when fitted with portable covers, or wooden or steel pontoons, checking of the satisfactory condition of:
  - i) wooden covers and portable beams, carriers or sockets for the portable beams, and their securing devices
  - ii) steel pontoons
  - iii) tarpaulins
  - iv) cleats, battens and wedges
  - v) hatch securing bars and their securing devices
  - vi) loading pads/bars and the side plate edge
  - vii) guide plates and chocks
  - viii) compression bars, drainage channels and drain pipes (if any)
- b) when fitted with mechanically operated steel covers, checking of the satisfactory condition of:
  - i) hatch covers
  - ii) tightness devices of longitudinal, transverse and intermediate cross junctions (gaskets, gasket lips, compression bars, drainage channels and, if any, drain pipes)
  - iii) clamping devices, retaining bars, cleating
  - iv) chain or rope pulleys
  - v) guides
  - vi) guide rails and track wheels
  - vii) stoppers, etc.
  - viii) wires, chains, gypsies, tensioning devices
  - ix) hydraulic system essential to closing and securing
  - x) safety locks and retaining devices
  - xi) the operation of hatch covers, by means of random examination: stowage and securing in open condition, proper fit, locking and efficiency of sealing in closed position, operational testing of hydraulic and power components, wires, chains and link drives
- c) checking of the satisfactory condition of hatch coaming plating and its stiffeners.

### **2.2.2.3 Bulk Carriers (Additional Requirements)**

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, should be surveyed open, closed and in operation to the full extent in each direction at each annual survey, including:

- d) Stowage and securing in open condition;
- e) Proper fit and efficiency of sealing in closed condition; and
- f) Operational testing of hydraulic and power components, wires, chains and link drives.

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

If there are indications of difficulty in operating and securing hatch covers, additional sets, at the discretion of the surveyor, should be tested in operation.

## **2.3 MACHINERY AND SYSTEMS**

### **2.3.1 General machinery installations**

#### **2.3.1.1**

The survey of general machinery installations is to cover the following items:

- a) general examination of machinery and boiler spaces with particular attention to the fire and explosion hazards; confirmation that emergency escape routes are practicable and not blocked
- b) general examination of the machinery, steam, hydraulic, pneumatic and other systems and their associated fittings, for confirmation of their proper maintenance
- c) testing of the means of communication and order transmission between the navigating bridge and the machinery control positions and other control stations
- d) confirmation that the rudder angle indicator on the bridge is in working order
- e) examination, as far as practicable, of the bilge pumping systems and bilge wells, including operation of the pumps, remote reach rods and level alarms, where fitted
- f) visual examination of the condition of any expansion joints in sea water systems
- g) external examination of pressure vessels other than boilers and their appurtenances, including safety devices, foundations, controls, relieving gear, high pressure piping, insulation and gauges.

#### **2.3.1.2**

When the vessel is equipped with a refrigerating plant (whether or not covered by an additional class notation), the annual survey is to include the external examination of:

- a) pressure vessels of the installation to the same extent as indicated in clause 2.3.1.1

- b) refrigerant piping, as far as practicable
- c) for refrigerating machinery spaces using ammonia as refrigerant:
  - i) ventilation system including functional test
  - ii) water-spraying fire-extinguishing system; see clause 2.3.4.2 d).
  - iii) bilge system including functional test
  - iv) electrical equipment, confirming its proper maintenance
  - v) gas detection system
  - vi) breathing apparatus and protective clothing.

### **2.3.1.3**

When the vessel is equipped with thruster installations, the annual survey is to include:

- a) an external examination of the machinery installation
- b) an operating test of the complete installation.

## **2.3.2 Boilers**

### **2.3.2.1**

For main and auxiliary boilers, the annual survey consists of an external examination of boilers and their appurtenances, including safety devices, foundations, controls, relieving, high pressure and steam escape piping, insulation and gauges.

### **2.3.2.2**

For thermal oil heaters, a functional test while in operation is to be carried out, during which the following items are checked:

- a) the heater for detection of leakages
- b) the condition of the insulation
- c) the operation of indication, control and safety devices
- d) the condition of remote controls for shut-off and discharge valves

A satisfactory analysis of the quality of oil is to be made available to the Surveyor.

### **2.3.2.3**

For exhaust gas thermal oil heaters, in addition to the requirements of clause 2.3.2.1, a visual examination and a tightness testing to the working pressure of the heater tubes are to be carried out.

## **2.3.3 Electrical machinery and equipment**

### **2.3.3.1**

The survey of electrical machinery and equipment is to cover the following items:

- a) general examination, visually and in operation, as feasible, of the electrical installations for power and lighting, in particular main and

emergency generators, electric motors, switchboards, switchgears, cables and circuit protective devices, indicators of electrical insulation and automatic starting, where provided, of emergency sources of power

- b) checking, as far as practicable, the operation of emergency sources of power and, where they are automatic, also including the automatic mode.

### **2.3.3.2**

The survey is also to cover the bridge control of propulsion machinery, and related arrangements (alarms and safety devices), when fitted.

## **2.3.4 Fire protection, detection and extinction**

### **2.3.4.1 Fire control systems**

The survey of fire prevention and other general arrangements is to cover the following items:

- a) checking that fire control plans are properly posted
- b) examination and testing, as feasible, of the operation of manual and/or automatic fire doors, where fitted
- c) checking, as far as practicable, that the remote controls for stopping fans and machinery and shutting off fuel supplies in machinery spaces and, where fitted, the remote controls for stopping fans in accommodation spaces and the means of cutting off power to the galley are in working order
- d) examination of the closing arrangements of ventilators, funnel annular spaces, skylights, doorways and tunnel, where applicable
- e) examination, as far as practicable, and testing, as feasible and at random, of the fire and/or smoke detection systems.

### **2.3.4.2 Fire fighting systems**

The survey requirements for all types of fire-fighting systems that are usually found on board vessels related either to machinery spaces or to cargo areas and/or spaces or to accommodation spaces, irrespective of the service notation assigned, are the following:

- a) water fire system
  - i) examination of the fire main system and confirmation that each fire pump including the emergency fire pump can be operated separately so that the two required powerful jets of water can be produced simultaneously from different hydrants, at any part of the vessel whilst the required pressure is maintained in the fire main
  - ii) checking that fire hoses, nozzles, applicators, spanners and international shore connection (where fitted) are in satisfactory working condition and situated at their respective locations
- b) fixed gas fire-extinguishing system

- i) external examination of receivers of CO<sub>2</sub> (or other gas) fixed fire-extinguishing systems and their accessories, including the removal of insulation for insulated low pressure CO<sub>2</sub> containers
- ii) examination of fixed fire-fighting system controls, piping, instructions and marking; checking for evidence of proper maintenance and servicing, including date of last system tests
- iii) test of the alarm triggered before the CO<sub>2</sub> is released
- c) sprinkler system
  - i) examination of the system, including piping, valves, sprinklers and header tank
  - ii) test of the automatic starting of the pump activated by a pressure drop
  - iii) check of the alarm system while the above test is carried out
- d) water-spraying system
  - i) examination of the system, including piping, nozzles, distribution valves and header tank
  - ii) test of the starting of the pump activated by a pressure drop (applicable only for machinery spaces)
- e) fixed foam systems (low or high expansion)
  - i) examination of the foam system
  - ii) test to confirm that the minimum number of jets of water at the required pressure in the fire main is obtained when the system is in operation
  - iii) checking the supplies of foam concentrate and receiving confirmation that it is periodically tested (not later than three years after manufacture and annually thereafter) by the manufacturer or an agent
- f) dry powder system
  - i) examination of the dry powder system, including the powder release control devices
  - ii) checking the supplies of powder contained in the receivers and that it has maintained its original smoothness
  - iii) checking that the pressure of propelling inert gas contained in the relevant bottles is satisfactory.

#### **2.3.4.3 Fire fighting equipment**

As far as other fire-fighting equipment is concerned, it is to be checked that:

- i) semi-portable and portable fire extinguishers and foam applicators are in their stowed positions, with evidence of proper maintenance and servicing, and detection of any discharged containers
- ii) firemen's outfits are complete and in satisfactory condition.

**2.3.4.4 Helicopter decks**

Where a helideck is fitted, the following is to be checked, as far as appropriate:

- a) drainage arrangements around the landing area
- b) fire fighting appliances and arrangements (to be surveyed as per clause 2.3.4.2, according to the equipment installed)
- c) overall examination of refuelling systems and hangar facilities for cleanliness and absence of leaks, condition of gutters and drainage arrangement.

**2.4 SAFETY MANAGEMENT SYSTEM**

For all vessels to which the ISM Code applies, the Society may have to report possible safety management system shortcomings, on the occasion of the Annual Survey, to the Organisation that has issued the Safety Management Certificate.

## CHAPTER 3 SCOPE OF INTERMEDIATE SURVEYS (ALL VESSELS)

### 3.1 GENERAL

#### 3.1.1

The requirements of this chapter apply to intermediate surveys of all vessels.

#### 3.1.2

The intermediate survey is to include examination and checks on a sufficiently extensive part of the structure to show that the structures of the vessel are in satisfactory condition so that the vessel is expected to operate until the end of the current period of class, provided that the vessel is properly maintained and other surveys for maintenance of class are duly carried out during this period.

### 3.2 HULL

#### 3.2.1

The requirements given in Table 3 for the survey and testing of salt water ballast spaces, cargo holds and cargo tanks (for non-ESP tankers) are to be complied with.

**Table 3 — Intermediate survey of hull (all vessels)**

ITEM	Age of vessel (in years at time of intermediate survey)		
	5 < age ≤ 10	10 < age ≤ 15	age > 15
SALT WATER BALLAST SPACES	Representative spaces internally examined  Thickness measurements, if considered necessary by the Surveyor  See notes 1, 2, 3 & 4	All spaces internally examined  Thickness measurements, if considered necessary by the Surveyor  Tightness of inner bottom plating of cargo holds in way of double bottom salt water ballast tanks checked  See notes 1, 3 & 4	
CARGO HOLDS			Selected cargo holds internally examined
CARGO TANKS (non-ESP tankers)			Selected cargo tanks internally examined

**Notes:**

1. If such examinations reveal no visible structural defects, the examination may be limited to verification that the protective coating remains effective.
2. Where the protective coating is found to be in **poor** condition, as defined in clause 1.3.2.11, where a soft coating has been applied or where a protective coating has never been applied, i.e. neither at the time of construction nor

thereafter, the examination is to be extended to other ballast spaces of the same type.

3. For salt water ballast spaces other than double bottom tanks, where a protective coating is found to be in **poor** condition, as defined in clause 1.3.2.11, and is not renewed, where soft coating has been applied or where a protective coating has never been applied, i.e. neither at the time of construction nor thereafter, maintenance of class is to be subject to the spaces in question being internally examined at annual surveys. The Society may consider waiving such internal examination at annual surveys of tanks protected with soft coating, whose size is 12 m<sup>3</sup> or less.

For salt water ballast double bottom tanks, where such breakdown of coating is found and is not renewed, where soft coating has been applied or where a protective coating has never been applied, i.e. neither at the time of construction nor thereafter, maintenance of class may be subject to the tanks in question being internally examined at annual intervals.

4. Due attention is also to be given to fuel oil piping passing through ballast tanks, which is to be pressure tested should doubts arise.

## CHAPTER 4 SCOPE OF CLASS RENEWAL SURVEY (ALL VESSELS)

### 4.1 GENERAL

#### 4.1.1

The requirements of this chapter apply to class renewal surveys of all vessels.

#### 4.1.2

The class renewal survey is to include sufficiently extensive examination and checks to show that the structures, main and auxiliary machinery, systems, equipment and various arrangements of the vessel are in satisfactory condition or restored to such condition as to allow the vessel to operate for the new period of class to be assigned, provided that the vessel is properly maintained and other surveys for maintenance of class are duly carried out during this period.

The examinations of the hull are to be supplemented by thickness measurements and testing as deemed necessary, to ensure that the structural integrity remains effective and sufficient to discover substantial corrosion, significant deformation, fractures, damages or other structural deterioration.

#### 4.1.3

The Owner is to provide the necessary facilities to enable this class renewal survey. The conditions for survey as detailed in clauses 1.3.5 to 1.3.7 are to be met.

#### 4.1.4

Upon completion of the class renewal survey, or at the end of the period of class (if the relevant part of the vessel is surveyed under the continuous survey system), a general examination of the vessel having the same scope as that of an annual survey, as detailed in Chapter 2, is to be carried out.

### 4.2 HULL AND EQUIPMENT

#### 4.2.1 Bottom survey in dry condition

##### 4.2.1.1 *Bottom survey*

A bottom survey in dry condition is to be carried out, as detailed in clause 5.2, and in addition the requirements given in clauses 4.2.1.3 to 4.2.1.5 are to be complied with.

##### 4.2.1.2 *Unusual vessels*

For vessels of unusual characteristics or engaged on special services, means of underwater inspection equivalent to the bottom survey in dry condition may be considered as an alternative by the Society, particularly

when a suitable high resistance paint is applied to the underwater portion of the hull or an approved system of impressed current for external cathodic protection is fitted.

#### **4.2.1.3 Ground tackle**

Anchors, windlass(es) and chain cables are to be ranged and examined, and the required complement and condition are to be checked. When the vessel is more than 5 years old, chain cables are to be gauged.

Any length of chain cable which is found to be damaged or excessively worn is to be renewed.

#### **4.2.1.4 Sea valves**

Sea valves and cocks are to be opened up for internal examination.

#### **4.2.1.5 Thickness measurements**

Thickness measurements of the outer shell plating, as and if required within the scope of the related class renewal survey, are to be carried out (refer to clause 4.2.5), if not already done within 15 months before the end of class period.

### **4.2.2 Decks, hatch covers and equipment**

#### **4.2.2.1**

Decks are to be examined, particular attention being given to the areas where stress concentrations or increased corrosion are likely to develop, such as hatch corners and other discontinuities of structure.

Deck erections such as hatch coamings, deckhouses and superstructures are to be examined.

The sheathing of wood-sheathed steel decks may be removed, at the Surveyor's discretion, in the case of doubt as to the condition of plating underneath.

Due attention is to be given to the examination in way of end and side openings and related shell and inner doors.

#### **4.2.2.2**

The survey of hatch covers and coamings is to include:

- a) checking of the satisfactory operation of all mechanically operated hatch covers: stowage and securing in open condition, proper fit, locking and efficiency of sealing in closed position, operational testing of hydraulic and power components, wires, chains and link drives
- b) checking of the effectiveness of sealing arrangements of all hatch covers by means of hose testing or equivalent
- c) thickness measurements of coaming and attached stiffeners, hatch cover plating and stiffeners (see Table 6).

#### **4.2.2.3**

The survey of hull equipment is to cover the following points:

- a) windlass and chain stoppers, with disassembly as deemed necessary to verify the condition of the equipment and control and safety devices, hawse pipes
- b) steering arrangements, including steering gear, control and indication devices, operational tests and disassembly as deemed necessary; in the case of chain and rod gears, chains, rods, sheaves, pins and rollers are to be examined for wear
- c) connection of masts and standing rigging to the hull structure as well as condition of structure underneath.

#### 4.2.2.4

Piping systems outside tanks and compartments are to be visually examined and pressure tested as necessary, as per the requirements laid down for the class renewal survey of machinery and systems; see clause 4.3.5.

#### 4.2.2.5

For all vessels, except vessels having the service notation **passenger vessel** or **ro-ro passenger vessel**, automatic air pipe heads installed on the exposed decks (i.e those extending above the freeboard deck or superstructure decks) are to be completely examined, both externally and internally, in accordance with the requirements given in Table 4.

**Table 4 — Requirements for internal and external examination of automatic air pipe heads at class renewal survey of all vessels, except vessels with service notation passenger vessel or Ro-Ro passenger vessel**

Age of vessel (in years at time of class renewal survey)		
5 < age ≤ 10	10 < age ≤ 15	age > 15
<p>Two air pipe heads, one port and one starboard, located on the exposed decks in the forward 25%L, preferably air pipes serving ballast tanks.</p> <p>Two air pipe heads, one port and one starboard, on the exposed decks, serving spaces aft of 25%L, preferably air pipes serving ballast tanks.</p> <p>See notes 1 &amp; 2.</p>	<p>All air pipe heads located on the exposed decks in the forward 25%L.</p> <p>At least 20% of air pipe heads on the exposed decks serving spaces aft of 25%L, preferably air pipes serving ballast tanks.</p> <p>See notes 1 &amp; 2.</p>	<p>All air pipe heads located on the exposed decks.</p> <p>See note 3.</p>

Notes:

- 1 The selection of air pipe heads to be examined is left to the attending Surveyor.
- 2 According to the results of this examination, the Surveyor may require the examination of other air pipe heads located on the exposed decks.
- 3 Exemption may be considered for air pipe heads where there is substantiated evidence of replacement within the previous five years.
- 4 For designs where the inner parts cannot be properly examined from outside, the examination is to include removal of the head from the air pipe.

- 5 Particular attention is to be paid to the condition of the zinc coating in heads constructed from galvanised steel.

### **4.2.3 Holds and other dry compartments**

Holds, 'tween decks, cofferdams, pipe tunnels and duct keels, void spaces and other dry compartments which are integral to the hull structure are to be internally examined, ascertaining the condition of the structure, bilges and drain wells, sounding, venting, pumping and drainage arrangements

#### **4.2.3.1**

Machinery and boiler spaces, pump rooms and other spaces containing machinery are to be internally examined, ascertaining the condition of the structure. 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 bulkheads in way of tank tops and bilge wells. Particular attention is to be given to the sea suction, sea water cooling pipes and overboard discharge valves and their connections to the shell plating. Where wastage is evident or suspected, thickness measurements are to be carried out, and renewals or repairs effected when wastage exceeds allowable limits.

Piping systems inside these spaces are to be dealt with according to clause 4.3.5.

#### **4.2.3.2**

Chain lockers are to be internally examined, while the anchor chains are ranged as required for the bottom survey in dry condition (see clause 4.2.1.3). The pumping arrangement of the chain lockers is to be tested.

### **4.2.4 Tanks**

#### **4.2.4.1**

The type and number of tanks to be internally examined at each class renewal survey are detailed in Table 5, according to the age of the vessel.

This internal examination is to ascertain the condition of the structure, bilges and drain wells, sounding, venting, pumping and drainage arrangements, including piping systems and their fittings. Due attention is to be given to plating or double plates below the lower end of sounding and suction pipes.

Where the inner surface of the tanks is covered with cement or other compositions, the removal of coverings may be waived provided they are examined, found sound and adhering satisfactorily to the steel structures.

#### **Notes:**

1. For examination of independent (non-structural) tanks, refer to clause 4.3.5.9.
2. Due attention is also to be given to fuel oil piping passing through ballast tanks, which is to be pressure tested when the vessel is more than 10 years old.

**4.2.4.2**

For salt water ballast spaces other than double bottom tanks, where a protective coating is found to be in **poor** condition and is not renewed, where soft coating has been applied or where a protective coating has never been applied, i.e. neither at the time of construction nor thereafter, maintenance of class is to be subject to the spaces in question being internally examined at annual surveys. The Society may consider waiving such internal examination at annual surveys of tanks protected with soft coating, whose size is 12 m<sup>3</sup> or less.

For salt water ballast double bottom tanks, where such breakdown of coating is found and is not renewed, where soft coating has been applied or where a protective coating has never been applied, i.e. neither at the time of construction nor thereafter, maintenance of class may be subject to the tanks in question being internally examined at annual intervals.

**4.2.4.3**

Boundaries of double bottom, deep, ballast, peak and other tanks, both integral and independent 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 the top of hatches for ballast/cargo holds.

**4.2.4.4**

Boundaries of fuel oil, lube oil and fresh water tanks are to be tested with a head of liquid to the maximum filling level of the tank. Tank testing of fuel oil, lube oil and fresh water 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.

**4.2.4.5**

For integral tanks which are intended to contain liquid cargoes such as edible oil, the Surveyor may waive the requirement specified in clause 4.2.4.4 subject to a satisfactory internal examination.

**Table 5 — Requirements for internal examination of integral (structural) tanks at class renewal survey**

Tank	Age of vessel (in years at time of intermediate survey)			
	age ≤ 5	5 < age ≤ 10	10 < age ≤ 15	age > 15
Peaks (all use)	all	all	all	all
Salt water ballast tanks (all types)	all	all	all	all
Fresh water	none	one	all	all
Fuel oil bunker tanks:				
Engine room	none	none	one	one
Cargo area	none	one	Two	half, minimum 2

Tank	Age of vessel (in years at time of intermediate survey)			
	age ≤ 5	5 < age ≤ 10	10 < age ≤ 15	age > 15
			See note 1	See note 1
Lubricating oil tanks	none	none	none	one
Cargo tanks	all	all	all	all

Notes:

1. One deep tank is to be included, if fitted.
2. Independent non-structural tanks are to be surveyed according to clause 4.3.5.9.
3. The extent of the survey of tanks dedicated to liquids other than those indicated in this table will be considered by the Society on a case by case basis according to the nature of the liquids.
4. If a selection of tanks is accepted to be examined, then different tanks are to be examined at each class renewal survey, on a rotational basis. Tanks not internally examined may be examined externally from accessible boundaries.

## 4.2.5 Thickness measurements

### 4.2.5.1

Thickness measurements are to be carried out according to the procedure detailed in clause 1.3.3.

The extent of thickness measurements is detailed in Table 6, according to the age of the vessel. Additionally, for any part of the vessel where wastage is evident or suspect, the Surveyor may require thickness measurements in order to ascertain the actual thickness of the material.

### 4.2.5.2

When the structure is coated and the coating is found to be in **good** condition the Surveyor may, at his discretion, accept a reduced program of thickness measurements in the corresponding areas. Other effective protective arrangements may also be considered.

### 4.2.5.3

When thickness measurements indicate **substantial corrosion**, the number of thickness measurements is to be increased to determine the extent of **substantial corrosion**. Table 7 may be used as guidance for additional thickness measurements.

## 4.3 MACHINERY AND SYSTEMS

### 4.3.1 General

#### 4.3.1.1

The survey items listed below are to be covered to the satisfaction of the Surveyor. However, other survey alternatives deemed equivalent by the Surveyor in relation to the characteristics and general condition of the vessel concerned may also be accepted.

Note:

Attention is drawn regarding the safe execution of surveys, in particular as regards health hazards related to asbestos.

**Table 6 — Requirements for thickness measurements at class renewal survey**

Age of vessel (in years at time of class renewal survey)			
age ≤ 5	5 < age ≤ 10	10 < age ≤ 15	age > 15
Suspect areas			
	Within the cargo area or 0,5 L amidships: <ul style="list-style-type: none"> <li>- selected deck plates</li> <li>- selected bottom plates</li> <li>- selected wind and water strakes</li> </ul>	Within the cargo area or 0,5 L amidships: <ul style="list-style-type: none"> <li>- each deck plate</li> <li>- selected tank top plates</li> <li>- selected bottom plates</li> <li>- all wind and water strakes</li> </ul>	Within the cargo area or 0,5 L amidships: <ul style="list-style-type: none"> <li>- each tank top plate</li> <li>- each bottom plate</li> </ul>
	One transverse section abreast a cargo space within the amidships 0,5L	Two transverse sections abreast of two different cargo spaces within the amidships 0,5L	Three transverse sections in way of cargo spaces within the amidships 0,5L <sup>(3)</sup>
		Outside the cargo area or 0,5 L amidships: <ul style="list-style-type: none"> <li>- selected deck plates</li> <li>- selected bottom plates</li> <li>- selected wind and water strakes</li> </ul>	<ul style="list-style-type: none"> <li>- all exposed main deck plating full length</li> <li>- representative exposed superstructure deck plating (poop, bridge and forecastle decks)</li> <li>- all wind and water strakes, port and starboard, full length</li> <li>- all keel plates full length</li> <li>- all bottom plates in way of cofferdams, machinery space and aft end of tanks</li> </ul>
	Hatch covers and coamings of the two foremost cargo holds <sup>(1)</sup>	All cargo hold hatch covers and coamings <sup>(1)</sup>	
	Collision bulkhead, forward machinery space bulkhead, aft peak bulkhead <sup>(1) (2)</sup>	all transverse and longitudinal bulkheads outside cargo hold area <sup>(1) (2)</sup>	
	<ul style="list-style-type: none"> <li>- sea water manifold in engine room</li> <li>- plating of sea chests</li> <li>- shell plating in way of overboard discharges as considered necessary by the attending Surveyor</li> </ul>		
		Selected cargo hold bulkheads (transverse and longitudinal) <sup>(1)</sup>	All cargo hold bulkheads (transverse and longitudinal) <sup>(1) (2)</sup>
		Internals in forepeak tank	Internals in forepeak and aft tanks
		Selected internal structure such as floors and longitudinals, transverse frames, web frames, deck beams, 'tween decks, girders, etc.  Measurements may be increased if the Surveyor deems it necessary	

Notes:

1. Including plates and stiffeners.
2. Measurements may be waived or reduced after satisfactory visual examination, when such bulkheads form the boundaries of dry (void) spaces.
3. The number of transverse sections may be reduced at the Surveyor's discretion for vessels of length under 90 m.

**Table 7 — Guidance for additional thickness measurements in way of substantial corrosion areas**

Structural member	Extent of measurements	Pattern of measurements
Plating	Suspect area and adjacent plates	5 point pattern over 1 square metre
Stiffeners	Suspect area	3 measurements each in line across web and flange

#### **4.3.2 Main and auxiliary engines and turbines**

##### **4.3.2.1 General**

Depending on the type of machinery, the following parts are to be opened up as necessary for inspection. Parts and components are to be pressure tested as appropriate or as deemed necessary by the Surveyor. A working test is also to be carried out, including testing of alarms and safety devices.

##### **4.3.2.2 Internal combustion engines**

- a) Columns and entablature
- b) Cylinders with their liners, cylinder covers (together with valves and valve gear), pistons with their rods, crossheads, slippers and guides (or gudgeon pins), connecting rods (with their top and bottom end bearings), control gear, driven scavenge pumps, driven air compressors, driven fuel pumps, supercharging blowers, fuel injection pumps, turning gear, etc.
- c) Crankshafts (together with their main bearings)
- d) Reverse gear, reduction gear and clutches, if fitted.

##### **4.3.2.3 Steam turbines**

- a) Condensers and their cooling water and condensate extraction pumps
- b) Casings and rotors (including their blading), impulse wheels (including guide blading and diaphragms), nozzles and nozzle boxes, journals and bearings, dummy pistons, labyrinths, external glands, etc.
- c) Shafts, including their flexible couplings.

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 the event of emergency operation of the plant are readily operable, the first class

renewal survey may be limited to the examination of rotor bearings, thrust bearings and flexible couplings, provided the Surveyor is satisfied from operation service records and power trials subsequent to the survey, that the turbine plant is in good working condition.

#### **4.3.2.4 Gas turbines**

- a) Casings, rotors and disks, impellers and blading of all turbines and compressors, combustion chambers, burners, heat exchangers, gas piping, compressed air piping with fittings, starting and reverse arrangements
- b) Shafts and their flexible couplings.

#### **4.3.2.5 Electric propulsion**

Where the propulsion machinery consists of an electrical system, the propulsion motors, generators, cables and all ancillary electrical gear, exciters and ventilating plant (including coolers) associated therewith are to be examined and the insulation resistance to earth tested. Due attention is to be given to windings, commutations and sliprings. The operation of protective gear and alarm devices is to be checked, as far as practicable. Interlocks intended to prevent unsafe operations or unauthorised access are to be checked to verify that they are functioning correctly.

#### **4.3.2.6 Thruster installations**

When the vessel is equipped with thruster installations, the class renewal survey is also to include:

- a) an examination of the machinery and electrical installation, as applicable
- b) an external examination of the propulsive part of the installation to be carried out at the dry dock survey due as part of the class renewal survey. During this examination other checks such as clearance readings, tightness of hub and blade sealing for controllable pitch propellers are to be verified. Locking arrangements for bolts, if fitted, are to be checked. Results of lubricating oil analysis to detect possible deterioration of internal gears and bearings or the presence of water are to be confirmed as acceptable. The Manufacturer's requirements may be taken into account. Dismantling of the assembly for the examination of internal parts may be required if the foregoing checks are not satisfactory
- c) a running test of the system under operating conditions.

#### **4.3.2.7 Pod propulsion systems**

When the vessel is equipped with pod propulsion systems, the class renewal survey is to include the examination of:

- a) electric propulsion motors and associated equipment, see clause 4.3.2.5
- b) pod orientation device (gears and wheels, hydraulic/electric system, sealing arrangements)

- c) oil lubricating system of shaft bearings
- d) bilge system inside pod
- e) ventilation and cooling system
- f) rotating commutator
- g) alarm system.

#### **4.3.3 Reduction gears, main thrust and intermediate shaft(s)**

##### **4.3.3.1**

Reduction gears complete with all wheels, pinions, shafts, couplings, bearings and gear teeth, including incorporated clutch arrangements, are to be opened up, as deemed necessary by the Surveyor, for visual inspection. For complicated assemblies, gears and roller bearings may be inspected without dismantling.

##### **4.3.3.2**

All shafts, thrust blocks and bearings are to be examined.

#### **4.3.4 Pumps and other machinery**

##### **4.3.4.1 General**

The items listed in clause 4.3.4.2 are to be opened up, as deemed necessary by the Surveyor, for visual inspection. Their parts and components are to be pressure tested as appropriate and considered necessary by the Surveyor. A working test is also to be carried out, including testing of alarms and safety devices if deemed necessary by the Surveyor.

##### **4.3.4.2 Items to be surveyed**

- a) Air compressors with their intercoolers, filters and/or oil separators and safety devices
- b) Heat exchangers, ventilation fans for boilers and other equipment used for essential services
- c) Piston pumps and centrifugal pumps for sea water, bilge and salt water ballast
- d) Screw pumps, gear pumps and centrifugal pumps other than those listed in c) above (opening up is not required).

#### **4.3.5 Systems in machinery spaces**

##### **4.3.5.1**

Valves, cocks and strainers of the bilge and ballast systems are to be opened up, as deemed necessary by the Surveyor, for visual inspection, and, together with the piping and safety devices, examined and tested under working conditions.

**4.3.5.2**

The fuel oil, lubricating oil, hydraulic oil, thermal oil, and feed and cooling water systems, together with pressure filters, heaters and coolers used for essential services, are to be opened up and examined or tested, as considered necessary by the Surveyor. Safety devices for the foregoing items are to be examined.

**4.3.5.3**

The compressed air system together with its valves, fittings and safety devices is to be examined, as considered necessary by the Surveyor.

**4.3.5.4**

Compressed air receivers and other pressure vessels for essential services are to be cleaned internally and examined internally and externally. Their fittings, valves and safety devices are to be opened up, as deemed necessary by the Surveyor, for visual inspection and pressure tested as appropriate.

**4.3.5.5**

Steel pipes for superheated steam having a temperature of the steam at the superheater outlet exceeding 450°C are to be examined and tested in accordance with clause 4.3.5.7 and 4.3.5.8 at each class renewal survey.

**4.3.5.6**

Steel pipes for saturated steam or superheated steam having a temperature of the steam at the superheater outlet not exceeding 450°C are to be examined and tested in accordance with 4.3.5.7 and 4.3.5.8 at each class renewal survey for vessels over 5 years of age. When the vessel is 5 years of age or less, the inspection may be limited to a check of the satisfactory general condition of pipes.

**4.3.5.7**

The examination and hydrostatic test of steel pipes for main steam machinery, and steel pipes for auxiliary steam machinery having internal diameter 75 mm and over, are to be carried out on a number of pipes selected by the Surveyor after the lagging in way is removed.

**4.3.5.8**

Representative pipe lengths connected with bolted flanges are to be internally and externally examined, and hydrostatically tested to 110% of the working pressure at ambient temperature. Bolts and butt-welded joints between flanges and pipes are to be submitted to a non-destructive test for crack detection.

**4.3.5.9**

Non-structural tanks located in machinery spaces are to be externally examined; the relevant fittings, with particular regard to the remote control

shut-off valves under hydrostatic head, are to be externally examined to check the efficiency of manoeuvres and the absence of cracks or leakage.

#### **4.3.5.10**

When the vessel is equipped with a refrigerating plant (whether or not covered by an additional class notation), the class renewal survey is to include:

- a) examination and test at the design pressure of the parts of the plant under pressure
- b) for refrigerating machinery spaces using ammonia as refrigerant:
  - i) examination and test of the water-spraying fire-extinguishing system to the same extent as indicated in clause 4.3.8.3 d)
  - ii) examination of valves and pumps of the bilge system to the same extent as indicated in clause 4.3.4
  - iii) examination and test of the electrical equipment to the same extent as indicated in clause 4.3.6.11
  - iv) test of the gas detection system.

### **4.3.6 Electrical equipment and installations**

#### **4.3.6.1**

An electrical insulation resistance test is to be performed on the electrical equipment and cables. If needed, for the purpose of this test, the installation may be subdivided or equipment which may be damaged disconnected.

#### **4.3.6.2**

The following minimum values, when performing the insulation test, are to be considered:

- a) for main and emergency switchboards, feeder circuit breakers being open, busbar circuit closed, measuring and monitoring instruments disconnected, the resistance of insulation measured across each insulated busbar and the hull, and across insulated busbars, should not be less than 1 megohm.
- b) for generators, the equipment and circuits normally connected between the generator and the first circuit breaker being connected, the resistance of insulation (preferably at working temperature whenever possible), in ohms, is to be greater than 1 000 times the rated voltage, in volts. If appropriate, the Surveyor checks also that the insulation resistance of generators separate exciter gear is not less than 250 000 ohms.
- c) the insulation resistance of the entire electrical system is to be checked with all circuit breakers and protective devices closed, except for generators; in general, the resistance should not be less than 100 000 ohms. However, the variation of the resistance with time is to be checked, comparing the current figure with previous readings. If the insulation resistance was to drop suddenly or be

insufficient, the defective circuits are to be traced, disconnecting the circuits as much as necessary.

#### **4.3.6.3**

The prime movers of generators are to be surveyed in accordance with clause 4.3.6.2 and their governors tested. All generators are to be presented for inspection, clean and with covers opened and examined under working conditions.

#### **4.3.6.4**

Main and emergency switchboards, section boards and distribution boards are to be cleaned and doors or covers opened for examination of their fittings. The condition of over current protective devices and fuses is to be checked. Circuit-breakers of generators are to be tested, as far as practicable, to verify that protective devices including preference tripping relays, if fitted, operate satisfactorily. The tightening of busbar connections is to be checked.

#### **4.3.6.5**

Electrical cables and cable runs are to be examined at random, in particular in places where deterioration is likely to occur; terminal boxes of essential services are also to be subjected to a random check.

#### **4.3.6.6**

The motors and starters concerning essential services together with associated control and switchgear are to be examined and, if considered necessary by the Surveyor, checked, as far as practicable, under working conditions.

#### **4.3.6.7**

Navigation light indicators are to be tested under working conditions, and correct operation on the failure of supply or failure of navigation lights verified.

#### **4.3.6.8**

The emergency sources of electrical power, their automatic arrangements and associated circuits are to be tested.

#### **4.3.6.9**

Emergency lighting, transitional emergency lighting, supplementary emergency lighting, general emergency alarm and public address systems are to be tested as far as practicable.

#### **4.3.6.10**

The visible condition of electrical equipment and installations is also to be checked as regards precautions against shock, fire and other hazards of electrical origin.

#### **4.3.6.11**

A general examination of the electrical equipment in areas where there may be flammable gas or vapour and/or combustible dust is to be carried out to ensure that the integrity of the electrical equipment of a safety type has not been impaired owing to corrosion, missing bolts, etc., and that there is not an excessive build-up of dust on or in dust-protected electrical equipment. Cable runs are to be examined for sheath and armouring defects, where practicable, and to ensure that the means of supporting the cables are in satisfactory condition. The proper condition of bonding straps for the control of static electricity is to be checked. Alarms and interlocks associated with pressurised equipment or spaces are to be tested for correct operation.

Note:

Owners are reminded that maintenance, repairs or renewal of certified electrical equipment of a safe type remains their responsibility or that of their representatives.

#### **4.3.7 Controls**

##### **4.3.7.1**

Where remote and/or automatic controls, not covered by an additional class notation related to automated installation, are fitted for essential machinery, they are to be tested to demonstrate that they are in satisfactory condition.

#### **4.3.8 Fire protection, detection and extinction**

##### **4.3.8.1**

The Owner or his representative is to declare to the attending Surveyor that no significant changes have been made to the arrangement of structural fire protection.

Note:

Attention is drawn to the provision that classification of a vessel does not relieve the Interested Party from compliance with any requirements issued by Administrations regarding compliance with any additional and/or more stringent requirements issued by the Administration of the State whose flag the vessel is entitled to fly.

##### **4.3.8.2**

The class renewal survey of fire prevention arrangements is to cover the following items.

- a) Visible parts of items forming part of structural fire protection arrangements in accommodation spaces and in machinery spaces such as bulkheads, decks, doors, stairways, crew and service lift trunks, and light and air trunks are to be examined, due attention being given to their integrity and that of the insulating material.
- b) The operation of manual/automatic fire doors, where fitted, is to be checked.
- c) Remote controls for stopping fans and machinery and shutting off fuel supplies in machinery spaces and, where fitted, remote controls for stopping fans in accommodation spaces and means of cutting off power to the galley are to be tested.

- d) Closing arrangements of ventilators, funnel annular spaces, skylights, doorways and tunnels, where applicable, are to be tested.
- e) Fire and/or smoke detection and alarm systems are to be tested.

#### 4.3.8.3

The survey requirements for all types of fire-fighting systems that are usually found on board vessels related either to machinery spaces or to cargo areas and/or spaces or to accommodation spaces, irrespective of the service notation assigned, are the following:

- a) water fire system
  - i) the associated pumps are to be opened up and examined at the Surveyor's discretion
  - ii) the fire main is to be hydrostatically tested to the working pressure at the Surveyor's discretion
- b) fixed gas fire-extinguishing system

Receivers of CO<sub>2</sub> (or other gas) fixed fire-extinguishing systems are to be externally examined together with all stationary fittings and devices. In addition, the following applies:

- i) the total loss of CO<sub>2</sub> is not to exceed 10% of the installed quantity
- ii) after being repaired or discharged, containers are to be subjected to a hydrostatic test
- iii) hydrostatic testing of high pressure CO<sub>2</sub> containers is to be carried out at intervals not exceeding 10 years; the number of the tested containers is to be not less than 10% of the total number
- iv) low pressure CO<sub>2</sub> containers are to be internally inspected if the content has been released and the container is older than five years; depending upon the result of the internal examination, the Surveyor may require the container to be hydrostatically tested.

It is to be checked that the distribution pipework is proved clear

- c) sprinkler system
  - i) the associated pumps are to be opened up and examined at the Surveyor's discretion
- d) water spraying system
  - i) the associated pumps are to be opened up and examined at the Surveyor's discretion
  - ii) a working test is to be carried out as far as reasonable and appropriate
- e) fixed foam systems (low or high expansion)
  - i) the associated pumps are to be opened up and examined at the Surveyor's discretion
- f) dry powder system

- i) it is to be verified that the propelling inert gas bottles have been hydrostatically tested. The same applies to bottles disembarked for refilling or embarked for replacement.

#### **4.3.8.4**

As far as other fire-fighting equipment is concerned, the following items are to be hydrostatically tested:

- a) any CO<sub>2</sub> bottles of extinguishers
- b) shells of foam extinguishers
- c) shells of powder extinguishers
- d) air or gas bottles associated with fire extinguishers whose shells are not kept under pressure (if internally examined, the test need not be performed).

#### **4.3.8.5**

Where a helideck is fitted, the following is to be checked, as far as appropriate:

- a) drainage arrangements around the landing area
- b) fire fighting appliances and arrangements (to be surveyed as per clauses 4.3.8.3 and 4.3.8.4, according to the equipment installed)
- c) other arrangements for helicopter refuelling and hangar facilities (fuel system, ventilation, fire protection and detection).

## CHAPTER 5 SCOPE OF BOTTOM SURVEY (ALL VESSELS)

### 5.1 GENERAL

#### 5.1.1

The requirements of this section apply to bottom surveys of all vessels.

#### 5.1.2

Examinations of the outside of vessel's bottom and related items of vessels is normally to be carried out with the vessel in dry-dock or on a slipway. However, consideration may be given to alternate examination while the vessel is afloat as an in-water survey, subject to provisions of clause 5.3 and associated subclauses.

### 5.2 BOTTOM SURVEY IN DRY CONDITION

#### 5.2.1 General requirements

##### 5.2.1.1 *Access to the vessel*

When a vessel 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.

##### 5.2.1.2 *Shell plating*

The shell plating is to be examined for excessive corrosion, or deterioration due to chafing or contact with the ground or for any undue unfairness or buckling. Special attention is to be paid to the connection between the bilge strakes and the bilge keels and to the plating of end structures (stem and sternframes). Important plate unfairness or other deterioration which do not necessitate immediate repairs are to be recorded.

##### 5.2.1.3 *Sea Chests*

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. Sea valves and cocks need not be opened up more than once in a class renewal survey period unless considered necessary by the Surveyor.

##### 5.2.1.4 *Propellers*

Visible parts of the propeller(s), stern bush(es), propeller shaft boss, brackets and tightness system(s) are to be examined. The clearances of the propeller shaft(s) (or wear down gauge) are to be checked and recorded. For controllable pitch propellers, the Surveyor is to be satisfied with the fastenings and tightness of hub and blade sealing.

Visible parts of other propulsion systems and propellers for steering purposes are also to be examined.

Dismantling is to be carried out, if considered necessary, notably where leakages are detected.

#### **5.2.1.5 Rudders**

Visible parts of the rudder(s), rudder pintles, rudder stock and couplings as well as the stern frame are to be examined. If considered necessary by the Surveyor, the rudder(s) is (are) to be lifted or the inspection plates removed for the examination of pintles.

The clearances in the rudder bearings and the rudder lowering are to be checked and recorded.

Where applicable, pressure test of the rudder may be required as deemed necessary by the Surveyor.

#### **5.2.2 Bottom survey held within the scope of class renewal survey**

The examination and checks detailed in clause 4.2 are to be carried out as part of the class renewal survey. They are usually carried out during the bottom survey held concurrently with the class renewal survey.

### **5.3 BOTTOM IN-WATER SURVEY**

#### **5.3.1 General**

##### **5.3.1.1**

Upon application by the Owner and in special circumstances, the Society may also authorise a bottom in-water survey for a vessel.

##### **5.3.1.2**

In principle, no outstanding recommendations are to exist requiring repair work to be carried out to the underwater part of the shell plating, the rudder, the propeller or the propeller shaft, unless the Society is satisfied that such repairs may be carried out while the vessel is afloat.

##### **5.3.1.3**

Proposals for in-water survey are to be submitted in advance of the survey by the Owner so that satisfactory arrangements can be agreed with the Society.

The in-water survey is to be carried out with the vessel at a suitable draught in sheltered water and preferably with weak tidal streams and currents. The in-water visibility is to be good and the hull below waterline is to be sufficiently clean to permit meaningful examination.

The 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 diving company to test all equipment beforehand.

**5.3.1.4**

The in-water survey is to be carried out by one or more qualified divers under surveillance of a Surveyor. The diver(s) is (are) to be employed by a certified company accepted by the Society.

The Surveyor is to be satisfied with the methods of localisation of the diver(s) on the plating, which should make use where necessary of permanent markings on the plating at selected points and with the method of pictorial representation. An efficient two-way communication between the Surveyor and the diver(s) is to be provided.

**5.3.1.5**

The bottom in-water survey is to provide the information normally obtained from a bottom survey carried out in dry condition, and the scope of the in-water survey is the same as detailed in clause 5.2.1, so far as practicable.

Upon completion of the survey, the approved diving firm is to submit to the attending Society Surveyor a detailed report including video tapes, as well as a photographic documentation of the main parts inspected.

**5.3.1.6**

If the in-water survey reveals damage or deterioration that requires immediate attention, the Surveyor may require that the vessel be dry docked in order that a detailed survey can be undertaken and the necessary repairs carried out.

## CHAPTER 6 SCOPE OF TAILSHAFT SURVEY (ALL VESSELS)

### 6.1 SURVEY OF TAILSHAFTS

#### 6.1.1 General

##### 6.1.1.1

The requirements of this chapter apply to tail shaft surveys of all vessels.

##### 6.1.1.2

The different types of surveys to which tailshafts may be subjected and the intervals at which they are to be carried out are given in clause 1.5.5. These surveys are:

- a) complete survey
- b) modified survey.

The requirements to be complied with at each survey are listed below.

#### 6.1.2 Complete survey

##### 6.1.2.1

The complete survey of tailshafts consists of the following, as applicable:

- a) removal of propeller and key, where fitted, and their examination
- b) complete withdrawal of shaft to permit the examination of sterntube bearings (outboard or inboard depending on the type of shaft)
- c) examination by an appropriate crack detection method of the after end of the cylindrical part of the shaft and forward one third of shaft cone, or the fillet of the flange in the case of a flanged coupling
- d) examination of shaft bearing surfaces, liners, joints, threaded end and nut
- e) examination of oil sealing glands with the necessary dismantling
- f) measurements of clearances and/or wear down (prior to and after the survey) and their recording
- g) opening-up of controllable pitch propellers and examination of their working parts and control gear.

### 6.2 PERIODICAL SURVEY OF OTHER PROPULSION SYSTEMS

#### 6.2.1 Rotating and azimuth thrusters

##### 6.2.1.1

The periodical survey of rotating and azimuth thrusters consists of:

- a) removing the propeller(s) in order to examine the following items, as applicable:
  - i) exposed parts
  - ii) cone and keyway to be checked by an appropriate crack detection method

- iii) sealing glands
- iv) threaded end and nut
- b) examining the results of a lubricating oil analysis (water content and presence of material particles) to detect possible deterioration of internal gears and bearings
- c) examining the orientation device.

If the foregoing checks are not satisfactory, dismantling of the internal parts may be required.

## **6.2.2 Vertical axis propellers**

### **6.2.2.1**

The periodical survey of vertical axis propeller systems consists of:

- a) checking the tightness of the oil glands and the backlash of the gears from outside by action on the blades
- b) checking the condition of gears and couplings from inside the ship
- c) examining the results of a lubricating oil analysis (water content and presence of material particles) to detect possible deterioration of internal gears and bearings.

If the foregoing checks are not satisfactory, dismantling of the internal parts may be required.

## **6.2.3 Pump jet systems**

### **6.2.3.1**

The periodical survey of pump jet systems consists of examining the following parts:

- a) impeller, shaft and clearances of bearings
- b) tightness of gland
- c) water duct
- d) steering nozzle
- e) reversing arrangements and control gear

If the foregoing checks are not satisfactory, further dismantling may be required.

## **6.2.4 Pod propulsion systems**

### **6.2.4.1**

The scope of complete and - where applicable- modified survey of the pod propulsion system shafting arrangement is the one detailed in clauses 6.1.2 and 6.2 for tailshafts.

### **6.2.4.2**

Where the system is fitted with:

- a) a vibration monitoring of roll bearings,
- b) a temperature monitoring of bearings,

c) and a monitoring of automatic bilge pumping system,  
the shaft need not be withdrawn at the complete survey and items b) and d) of clause 6.1.2.1 need not be covered provided that all condition monitoring data (vibrations and temperatures in way of bearings, consumption and analysis of lubricating oil, running rate of bilge system) are found to be within permissible limits and the remaining requirements for the complete survey are complied with.

Where the Surveyor considers that the data presented is not to his satisfaction, further dismantling is to be required.

## CHAPTER 7 SCOPE OF BOILER SURVEY (ALL VESSELS)

### 7.1 GENERAL

The requirements of this chapter apply to boiler surveys of all vessels.

### 7.2 STEAM BOILERS

#### 7.2.1

##### 7.2.1.1

Steam boilers, superheaters and economisers are to be examined internally and externally with the periodicity given in clause 1.5.7. To this end, boilers are to be emptied and suitably prepared for the examination, and the water-steam side and fire side are to be cleaned and cleared of soot. Where necessary, the external surfaces are to be made accessible for inspection by removal of insulation and lining.

##### 7.2.1.2

Subject to the results of this visual examination, the Surveyor may require:

- a) non-destructive tests for detection of possible defects in critical areas of plating and shells, pipes and stays
- b) thickness measurements of plating and shells, furnaces, pipes and stays.

If appropriate, a new working pressure may be fixed by the Society.

When situated inside boiler combustion chambers, steam pipes of cylindrical boilers are to be examined at their ends, and if deemed necessary by the Surveyor, a sample pipe is to be removed for examination.

##### 7.2.1.3

If the internal examination is not carried out for practicable reasons, the parts subject to pressure are to be submitted to a hydraulic test.

##### 7.2.1.4

Boiler supports and securing arrangements (fixed and sliding seating, chocks, rolling stays, if any, etc.) are to be examined.

Boiler accessories and mountings (such as valves and studs, water level indicators, safety valves) are to be externally and (as needed) internally examined.

Forced circulation pumps of fired steam generators are, wherever possible, to be opened up.

Fuel supply pipes between pumps and burners, fuel tank valves, pipes and deck control gear are to be examined.

**7.2.1.5**

Upon completion of the internal survey, the boiler is to be examined under steam and fuel oil burners and safety devices checked under working conditions.

Safety valves are to be checked for their setting. For auxiliary exhaust gas boilers, if steam cannot be raised at port, it is the Chief Engineer's responsibility to set the safety valves at sea and record the setting pressure in the log-book.

**7.3 THERMAL OIL HEATERS****7.3.1****7.3.1.1**

Thermal oil heaters are to be internally and externally examined. The heater tubes are to be visually examined, and the tightness of the installation (including flange connections, valves and pumps) is to be checked through a test at the working pressure.

**7.3.1.2**

Thermal oil heater supports and securing arrangements are to be examined.

Heater accessories and mountings are to be externally and (as needed) internally examined.

Forced circulation pumps are, wherever possible, to be opened up.

Fuel supply pipes between pumps and burners, fuel tank valves, pipes and deck control gear are to be examined.

**7.3.1.3**

The following safety devices and instrumentation are to be examined and tested:

- a) thermal fluid temperature safety device and control
- b) thermal fluid flow meter
- c) device for low thermal fluid level in the expansion tank
- d) other regulation and safety systems.

**7.3.1.4**

Where repairs and/or renewal of components exposed to pressure are performed, a pressure test is to be carried out to 50% greater than the working pressure

**7.3.1.5**

Upon completion of the survey, the thermal oil heater is to be examined under working conditions, with particular attention to safety devices and controls of the plant.