

## Section 3

### Surveys - General Requirements

#### A. General Information

##### 1. Surveys for maintenance of class

**1.1** For maintenance of the class, the regular periodical and non-periodical surveys of hull, machinery, including electrical installation, and any special equipment classed as defined below have to be performed, see also [Section 2](#), [B.2](#), and [Section 4](#).

Other surveys performed by GL are listed in [4](#).

**1.2** Surveys required for maintenance of the class, e.g. in the case of repairs of, or modifications to any parts subject to Classification, are to be agreed with the local GL representation in due time, so that the measures envisaged may be assessed and supervised, as required.

**1.3** The Surveyors are to be given access at any time to the ship and/or to the workshops, so that they may perform their duties, see also [Section 2](#), [D.3.1.4](#).

In this connection all areas to be surveyed have to be cleared, cleaned and to be made free from gas, as deemed necessary by the Surveyor.

The Class Certificates and other particulars relating to classification are to be made available to the Surveyor on request.

**1.4** Surveys conducted during a voyage may be agreed and credited to periodical surveys due (e.g. inspection of large holds by boat). The prerequisites, procedures and specific (e.g. weather) conditions to be met will be fixed from case to case. The decision as to feasibility of the survey may only be taken in agreement with the Surveyor.

**1.5** GL will inform the owner or operator about the status of class, indicating the last recognized surveys and the next due dates. However, even if not provided with such information, the operator is obliged to have the surveys stipulated by the present Rules performed.

**1.6** GL may agree to test and analysis procedures as a supplement to or equivalent substitute for conventional survey and inspection such as by uncovering/opening up of components, see also [B.1.3.7](#).

**1.7** GL reserve the right for given reasons, e. g. in the light of special experience gained during opera-

tion, to extend the scope of survey and/or inspection or to carry that out with two Surveyors, if needed.

**1.8** GL reserve the right to demand surveys to be held between the due dates of regular surveys, if this is necessary, see [B.2](#).

**1.9** If a ship has to be surveyed in a port beyond the reach of a GL Surveyor (also in the events of force majeure or of armed conflicts); GL Head Office will have to be notified. Upon checking of the facts, the further procedure will then be decided on.

In extraordinary cases and with GL Head Office agreement, it is possible to call for an external expert, whose report is, however, subject to examination by GL, who will decide on whether or not the ship will have to be re-surveyed.

##### 2. Selection of Surveyors

On principle, the acting Surveyors will be chosen by GL. However, the operator of a ship and/or an installation classed is free to have any findings of surveys or decisions which he deems to be doubtful checked by other GL Surveyors upon his request.

##### 3. Documentation, confirmation of class

**3.1** The records of each survey, as well as any requirements upon which maintenance of the class has been made conditional, will be entered into the respective Survey Statement. By his signature in the certificate and other documents the Surveyor only certifies what he himself has seen and checked during the particular survey.

**3.2** The reports prepared by the Surveyor will be sent to GL Head Office. If there are no objections, the results will be documented in the GL Register Book and the confirmation of Class effected by the Surveyor in the Certificate will acquire final validity.

**3.3** In Part 2 of the Register Book the dates of the surveys will be indicated, such as Class renewals I, II, III, etc., annual survey, intermediate survey, continuous class renewal, bottom and propeller shaft survey. Records on periodical repeat tests on steam boilers and thermal oil heaters will in the case of seagoing ships be also entered in special Test Certificates, which are to be kept on board.

For inland vessels see [Section 4](#), [G](#).

**3.4** A confirmation of class affected by the Surveyor relates to the kind of survey referred to in the report and is valid under the reservation that examination by Head Office will not give cause for any objections, see [3.2](#).

**3.5** On request, the class may be confirmed in writing by a separate certificate. However, such certificates are valid only if issued by GL Head Office or if, in exceptional cases, Head Office has expressly authorized the field service representatives to do so.

**3.6** Where defects are repaired provisionally only, or where the Surveyor does not consider immediate repairs or replacements necessary, the vessel's class may be confirmed for a limited period by making an entry in the survey statement to the Certificate of Classification. Cancellation of such limitations will also have to be indicated in the Survey Statement.

#### **4. Surveys in accordance with flag state regulations**

**4.1** Where surveys are required on account of international conventions and of corresponding laws/official ordinances of a flag state, GL will undertake them on application, or by official order, acting on behalf of the authorities concerned, based on the respective provisions; this includes surveys according to:

- the International Convention on Load Lines (**ILC 66**)
- the International Convention for the Safety of Life at Sea (**SOLAS 74**)
- the International Convention for the Prevention of Pollution from Ships (**MARPOL 73/78**)
- the IMO Codes, e.g. on Chemical and Gas Tankers
- the related Conventions of the International Labour Office (ILO)

Where possible, such surveys will be carried out simultaneously with the class surveys.

**4.2** GL will also undertake on request other surveys and checks stipulated by additional regulations and requirements of the flag state. Such surveys are subject to agreements made in each individual case and/or to the regulations of the country concerned.

**4.3** All activities as outlined in 4.1 and 4.2 and, where applicable, issuance of relevant certificates are likewise subject to the general conditions of [Section 1](#).

**4.4** If for some reason a vessel's class has expired or has been withdrawn by GL, all statutory certificates issued by GL will automatically become void. If sub-

sequently the class is renewed or re-assigned, validity of these certificates will be revived within the scope of its original period of validity, provided that all surveys meanwhile having fallen due have been carried out.

#### **5. External service suppliers**

The personnel or firms engaged in services affecting classification and statutory work are subject to approval by GL.

#### **B. Surveys for Maintenance of Class - Definitions, Due Dates**

##### **1. Periodical surveys**

###### **1.1 Annual surveys (seagoing ships)**

**1.1.1** For seagoing ships, annual surveys are to be conducted for the hull and the machinery, including the electrical plant, and, where applicable, for special equipment classed, at intervals of 12 months, as from the date of commencement of the class period indicated in the certificate, see [C.1.1](#).

###### **1.1.2 Survey period (time window)**

The survey has to be carried out within a time interval of 3 months before to 3 months after the day at which the current class period will complete one year of validity. This time window also applies to the periodical annual Class Surveys for ships with the Notation **HSC-Passenger A** or **B** as defined in Section 2, [C.3.1.3.10](#).

For ships with accommodations for more than 12 passengers, the annual survey has to be carried out not later than the due date entered.

##### **1.2 Intermediate surveys**

Extended annual surveys are referred to as intermediate surveys, see [C.1.2](#) and [D.2.2](#), respectively.

The intermediate survey falls due nominally, 2.5 years after commissioning and each class renewal and may in the case of seagoing ships be carried out on the occasion of the second or third annual survey.

Refrigerating installations see [D](#).

Special ship types see [Section 4](#).

##### **1.3 Class Renewal Surveys**

**1.3.1** Class Renewal Surveys are to be carried out for the ship's hull, machinery, including the electrical plant, and, for any special equipment classed, at the intervals indicated by the Character of Classification for the hull, see [C.1.3](#) and [Section 4](#), Special Ship Types.

For avoiding loss of Class, in exceptional cases extension of the Class period by 3 months at the most may be granted by GL upon request.

**1.3.2** A Class Renewal may be carried out in several parts. The Class Renewal survey may be commenced at the 4<sup>th</sup> annual survey and must have been completed by the end of the class period. The total survey period must not exceed 15 months.

**1.3.3** The periodical surveys and inspections of propulsion systems and machinery as per 1.4 and 1.5 form an integral part of the surveys required for Class Renewal, unless otherwise specified in the following.

**1.3.4** Class Renewals for the hull are numbered in the sequence I, II, III, etc. Class Renewal IV and subsequent ones correspond to Class Renewal III. Regarding their scope see C.1.3.2.

**1.3.5** The new period of Class will commence:

- with the following day, after which the previous class expires, provided that the Class Renewal Survey has been completed within 3 months preceding that date. This applies also to a granted extension of the Class period by 3 months at the most
- with the date on which the surveys for Class Renewal have been completed, if this is the case more than 3 months before expiry of the previous Class

### **1.3.6 Continuous Class Renewal Surveys**

**1.3.6.1** At owner's request, the surveys required for class renewal may be split, according to a schedule to be agreed, such as to extend over the entire period of Class so that about 20 % of all surveys required for Class Renewal will be completed every year.

This means that all areas subject to survey as defined by GL Head Office are to be surveyed at least once per Class period, unless closer intervals are prescribed elsewhere. The period between two subsequent surveys of each area must not exceed 5 years.

Exception for hulls of oil tankers/product carriers, chemical tankers and bulk carriers with **Class Notation ESP**, see Section 4, A.4.1.5, C.4.1.6 and E.4.1.3.

**1.3.6.2** Continuous Class Renewal may be applied for separately for the hull, the machinery and the special equipment.

**1.3.6.3** Regarding the duration of the period of Class and due dates of surveys, the requirements 1.3.1 and 1.3.5 continue to be applicable.

**1.3.6.4** At the end of a period of Class, for the purpose of Class Renewal, a final survey will be performed, during which the Surveyor will satisfy himself as to whether all areas required to be surveyed

have been surveyed throughout, and with satisfactory results. If there are special reasons, the Surveyor may inspect individual parts again.

**1.3.6.5** Ships surveyed subject to the Continuous Class Renewal system, are not exempted from other periodical surveys (such as annual and intermediate surveys) prescribed.

### **1.3.7 Continuous Class Renewal Surveys based on preventive maintenance systems**

**1.3.7.1** On owners' request, an optimized Continuous Class Renewal system may be agreed upon as outlined below for ships the machinery of which is maintained with the aid of an approved, computer-assisted maintenance system.

**1.3.7.2** Owners will introduce a preventive maintenance system (Planned Maintenance System) comprising at least the survey scopes/systems as covered by the normal Continuous Class Renewal system.

**1.3.7.3** This maintenance system will have to be approved by GL, to this effect, owners will submit the following documentation, in English or German language:

- detailed description of the system, indicating the information flows
- list of components/systems to be covered by the optimized Continuous Class Renewal system (inventory content)
- indication of intervals for each of the maintenance measures in general
- list of maintenance intervals (TBO) and of the expected lifetime (LT) of the main and auxiliary machinery components essential for operation, taking into account manufacturers' recommendations and specific operational requirements
- list of instructions (maintenance procedures) underlying the maintenance concept.
- maintenance documentation (reports containing important operational information, component condition, offset sheets, measures carried out)
- documentation on the maintenance strategy applied prior to filing of the application

**1.3.7.4** Within the scope of a shipboard survey the GL Surveyor will have to confirm that:

- the current maintenance system complies with the approved documentation
- the current maintenance system takes into account, without reservation, the specific service conditions
- the maintenance documentation permits conclusions to be drawn as to be construction condition and operability of the machinery

- the personnel in charge of operation of the machinery are properly qualified and hold the necessary qualification certificates

**1.3.8** Machinery or technical installations, which are subject to a Condition Monitoring System, are surveyed in line with the requirements and prerequisites described in Part 1 – Seagoing Ships, Chapter 17 – Guidelines for Machinery Condition Monitoring. Prerequisite for the acceptance of a Condition Monitoring System is the existence of a Planned Maintenance System (PMS), approved by GL.

The Condition Monitoring System is not limited to the equipment used to determine the machinery's condition, but also in addition consists of the applied procedures and schedules for data collection and analysis.

Information derived from Condition Monitoring of technical installations, machinery, or parts of machinery, can be accepted by GL as equivalent to direct inspection, if the information results provided are reliable and trustworthy for assessing the actual condition as it would be derived from direct inspection.

In this case, for the particular installation, machinery or part of machinery, which are covered by Condition Monitoring, the conventional survey can be omitted, if Condition Monitoring shows that previously defined acceptance criteria are met. Any item of the installation or machinery not covered by Condition Monitoring shall be surveyed and credited in the conventional way.

### 1.3.9 Class extension

Seagoing Ships see [1.3.1](#) and Inland Vessels see [Section 4, G](#).

## 1.4 Periodical surveys of propeller shafts and tube shafts, propellers, vane wheels and other systems

For maintenance of the Class, periodical surveys and tests of propeller shafts and tube shafts, propellers, vane wheels and other systems of seagoing ships are to be carried out. The scope of surveys and tests unless specifically restricted is defined in C.1.4.

For inland waterway vessels, see [Section 4.G](#).

### 1.4.1 Propeller shafts and tube shafts

The following surveys are applicable:

- normal survey
- modified survey
- partial survey

#### 1.4.1.1 Normal survey

**1.4.1.1.1** Where the propeller shafts and tube shafts are fitted with continuous liners or approved oil sealing glands, or are made of corrosion resistant materials, the interval of survey is to be:

- 3 years for single shafting arrangement
- 4 years for multi-shafting arrangement

The interval of drawing may be raised to:

- 5 years for single shafting arrangement
- 5 years for multi-shafting arrangement

at the most, in any of the following three cases:

- where
  - the propeller is fitted to a keyed shaft taper
  - the design details of which are approved
  - the shaft is protected from seawater
  - a non-destructive examination is made at each survey by an approved crack-detection method of the after end of the cylindrical part of the shaft (from the after end of the liner, if any), and of about one third of the length of the taper from the large end, or
- 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
  - a non-destructive examination is made at each survey by an approved crack detection method of the after flange fillet area of the shaft, or
- where
  - the propeller is fitted keyless to the shaft taper
  - the shaft is protected from seawater
  - the design details are approved
  - a non-destructive examination is made at each survey by an approved crack detection method of the forward part of the aft shaft taper

In all other cases the nominal interval of survey is to be 2,5 years with an admissible time window of  $\pm 6$  months.

**1.4.1.1.2** Propeller shafts and tube shafts are to be sufficiently drawn to permit entire examination. For further details see [C.1.4.1.1.1](#).

For oil lubricated arrangement, the shaft need not be drawn at the occasion of the normal survey, provided that all exposed areas of the after shaft area as described in 1.4.1.1.1 are examined by an approved crack-detection method without drawing of the shaft,

- where
  - the clearances and wear down of the bearings
  - the records of lubricating oil analysis, oil consumption and bearing temperature
  - the visible shaft areas

are examined and found satisfactory. Lubricating oil and bearing temperature controls are to be performed as specified in 1.4.1.2.2. For further details see C.1.4.1.1.2. Where any doubt exists regarding the findings of the above, the shaft is to be sufficiently drawn to permit an entire examination.

#### **1.4.1.2 Modified survey**

**1.4.1.2.1** For single and multi-shafting arrangements a modified survey may be accepted instead of the normal survey at alternate 5 yearly survey intervals, at the most, subject to:

- the shaft is fitted with oil lubricated bearings and oil sealing glands
- the shaft and its fittings are not exposed to corrosion
- new oil seals may be fitted without removal of the propeller (except in the case of keyed propeller)
- the design details are approved

and provided that the clearances of the aft bearing are found in order and the lube oil and the oil sealing arrangements have proved effective in any of the following three cases:

- where the propeller is keyed on the shaft taper and suitable crack-prevention measures are taken, or
- where the propeller is fitted to a solid flange coupling at the end of the shaft, or
- where the propeller is fitted keyless to the shaft taper

The maximum interval between two successive normal surveys is not to exceed 10 years.

**1.4.1.2.2** The shaft is to be sufficiently drawn to permit examination of the aft bearing contact area of the shaft. For further details see C.1.4.1.2.1.

Drawing of the shaft to expose the aft bearing contact area of the shaft may not be required where a lubricating oil analysis is carried out regularly at intervals not exceeding 6 months, and the oil consumption and bearing temperature are recorded and considered to be within permissible limits. The documentation on lubricating oil analysis is to be available on board and be checked. Each analysis should include the minimum parameters:

- water content

- chloride content
- content of bearing metal particles
- oil aging (resistance to oxidation)

Oil samples should be taken under service conditions. For further details see C.1.4.1.2.2. Where any doubt exists regarding the findings of the above, the shaft is to be sufficiently drawn to permit an examination according to C.1.4.1.2.1.

#### **1.4.1.3 Partial survey**

**1.4.1.3.1** Upon request by the Owner for shafts where the modified survey is applicable and

- a prolonged service fatigue life of seals is expected due to the appropriate combination of materials and controlled pressures in way of seals

consideration may be given to a prolongation of the 5-yearly interval between normal surveys, provided a partial survey is performed.

In no case must the interval between normal surveys exceed 1,5 times the due interval.

**1.4.1.3.2** The partial survey consists of checking the oil sealing glands and the clearance of the bearings.

For keyed propellers, the propeller is to be dismantled to expose the forward part of the taper and a non-destructive examination by an approved crack detection method is to be performed.

For further details see C.1.4.1.3.

#### **1.4.2 Propellers**

During normal or modified surveys of the propeller shafts and tube shafts, the propellers as well as the remote and local control gear of controllable pitch propellers are to be surveyed at the Surveyor's discretion, depending on the findings.

#### **1.4.3 Vane wheels**

Vane wheels are to be examined in dismantled condition in intervals of nominally 2,5 years with an admissible time window of  $\pm 6$  months.

#### **1.4.4 Other systems**

Other systems for main propulsion purposes, such as rudder and steering propellers, pod propulsion systems, pump jet units, etc., are subject to the same survey intervals as propeller shafts and tube shafts.

### **1.5 Periodical surveys and tests of individual machinery items**

**1.5.1** The periodical surveys of individual machinery items or installations listed below are to be carried out in addition to those prescribed in 1.3 and C.1.3.3, for maintenance of class.



For inland vessels, see [Section 4, G](#).

## 1.5.2 Steam boilers

**1.5.2.1** Steam boilers are to be subjected to the following examinations and tests at regular intervals <sup>1</sup>. The term 'steam boilers' includes exhaust gas boilers in the exhaust gas pipe system of combustion engines and hot water boilers with outlet temperatures exceeding 120 °C (except where they are heated by steam or liquids).

### 1.5.2.2 External inspection

Boilers are to be subjected at annual intervals to an external inspection in accordance with the GL inspection programme.

For the external inspection a time window of  $\pm 3$  months is admissible.

### 1.5.2.3 Internal inspection

Steam boilers are to be subjected to an internal survey twice in every 5-year class period. The first internal survey has to be carried out on the occasion of the 2<sup>nd</sup> but not later than the 3<sup>rd</sup> regular annual survey. The maximum interval between internal surveys should not exceed 3 years. For ships with one main boiler only, internal inspections are to be performed every 2.5 years until 10 years after commissioning and every year thereafter. Boiler installations with only one main boiler and one auxiliary boiler powerful enough to operate the propulsion plant in an emergency (take-home boiler), count as multi-boiler plants.

## 1.5.3 Thermal oil plants

### 1.5.3.1 External inspection

Thermal oil plants are to be subjected to an external inspection once a year. Proof of continued usability of the thermal oil shall be furnished yearly by a competent testing agency, see [C.1.5.3](#).

For the external inspection a time window of  $\pm 3$  months is admissible.

### 1.5.3.2 Internal inspection

An internal inspection, including a tightness test of the whole plant, is to be performed at intervals of 5 years, counting from commencement of initial operation, and possibly in connection with a class renewal survey.

<sup>1</sup> More extensive regulations of the country, where the ship is registered, may have to be observed. Steam boiler plants on board German flag seagoing vessels are subject to official boiler inspections by GL. The "Richtlinien über Prüfung von Dampfkesselanlagen entsprechend der Dampfkesselverordnung auf Schiffen unter der Flagge der Bundesrepublik Deutschland" ("Regulations for Testing of Steam Boiler Plants in Accordance with the German Boiler Regulations") are to be applied to this effect

## 1.5.4 Steam pipes

**1.5.4.1** Steam pipes are to be examined regularly every 5 years, possibly in connection with a class renewal survey. Starting from class renewal II the steam pipes are to be examined as to their internal and, where advisable, as to their external condition as well, employing non-destructive testing methods, where necessary, see [C.1.5.4](#).

**1.5.4.2** Steam pipes with service temperatures exceeding 500 °C are to be examined for expansion at 5 year intervals, starting from class renewal II, at the latest.

## 1.5.5 Pressure vessels

**1.5.5.1** Pressure vessels which are subject to survey by GL according to the Construction Rules, are to be examined internally and externally every 5 years, possibly in connection with a class renewal survey.

**1.5.5.2** Pressure vessels having a product of pressure [bar] by cubic capacity [l] of  $p \times l \leq 200$  are to be surveyed on the occasion of checking of the pertinent piping system.

**1.5.5.3** Periodical tests of CO<sub>2</sub> cylinders and other gas cylinders for fire-extinguishing purposes are to be carried out at intervals not exceeding 10 years. At least 10 % of the gas cylinders provided are to be subjected to an internal inspection and hydrostatic test. Halone containers of existing fixed Halone fire-extinguishing systems are exempted from this requirement.

Irrespective thereof, on the occasion of recharging CO<sub>2</sub> cylinders, Halone containers and other gas cylinders are to be tested, if the last test dates back 10 years or more.

**1.5.5.4** Low pressure CO<sub>2</sub> bulk storage containers are subject to internal survey if the content has been released and the container is more than 5 years old but not more frequently than once within five years.

**1.5.5.5** In the case of vessels for powder extinguishing agents, periodical pressure tests may be dispensed with, provided that their internal inspection does not reveal any deficiencies.

**1.5.5.6** Receivers in hydraulic or pneumatic control systems are to be examined during maintenance and repairs at the system; air receivers with a product of pressure by cubic capacity  $p \times l \geq 1000$  (p in bar) are to be subjected to an internal inspection at least once during each class period and/or at intervals not exceeding 5 years.

**1.5.5.7** The intervals between surveys as referred to may be reduced, depending on the findings.

### 1.5.6 Automation equipment

**1.5.6.1** For confirmation of the class notation, machinery having been assigned the notations **AUT**, **AUT-nh**, **AUT-Z** or **RC** is to be inspected in accordance with GL programmes AUT 3 and AUT 4, respectively.

#### 1.5.6.2 AUT 3

This (non-recurring) survey is to be carried out 6 months after commissioning of the ship and/or in the case of retrofitting, major conversions or repairs of the automation equipment, 6 months after the initial survey and extraordinary survey after conversion, respectively. It serves the purpose of confirmation of the relevant notation, following a trial phase.

#### 1.5.6.3 AUT 4

In the case of seagoing as well as inland waterway vessels, this survey is to be performed nominally every 2.5 years, preferably during each class renewal and intermediate survey, and on ships equipped for more than 12 passengers, annually.

Any deviating intervals as stipulated by the flag state are to be observed.

The first due date will be counted as from the date of commissioning of the ship and/or of its retrofitting.

### 1.5.7 Inert gas systems

Inert gas installations of the cargo tank area of tankers are to be checked annually as to their operability. Tankers with the class notation **INERT** are to be surveyed in accordance with GL programme INERT 4, at intervals of nominally 2.5 years, preferably on the occasion of each class renewal and intermediate survey, see [Section 4, A. to D.](#)

## 1.6 Bottom surveys

**1.6.1** Bottom surveys serve the purpose of periodical checking of the underwater hull, of the openings and closures in the shell related to the machinery, and of externally arranged components of the steering and propulsion system, see [C.1.4](#) and [C.1.6](#).

**1.6.2** Seagoing ships carrying the character of class **100A5** are within a 5-year class period to be twice subjected to a bottom survey. The first bottom survey has to be carried out on the occasion of the 2<sup>nd</sup> but not later than the 3<sup>rd</sup> regular annual survey.

As a matter of principle, class renewals include a bottom survey, which is then accepted as the 2<sup>nd</sup> regular bottom survey.

The maximum interval between two successive bottom surveys is not to exceed 36 months. The following bottom survey is then to be held latest after 24 months.

**1.6.3** Seagoing ships having a character of classification other than **100A5** are to be subjected to bottom surveys at intervals corresponding to half the respective period of class.

**1.6.4** Seagoing ships with accommodations for more than 12 passengers are to be presented for bottom survey at intervals of 1 year.

**1.6.5** It is expected that also for each bottom survey performed in addition to the bottom surveys stipulated by the classification requirements a Surveyor will be called to attend.

**1.6.6** The surveys may be carried out on the occasion of a scheduled intermediate survey, see [1.2](#) and for ships referred to in [1.6.4](#), on the occasion of the annual survey.

**1.6.7** If a bottom survey is intended to be credited to a class renewal, all tests of hull and machinery prescribed for the respective class renewal and usually requiring dry-docking will have to be carried out.

A bottom survey for class renewal may be carried out up to 15 months before completion of the class renewal.

**1.6.8** For inland waterway vessels see [Section 4, G.](#)

## 1.7 In-water surveys (seagoing ships)

**1.7.1** For ships assigned the class notation **IW**, an in-water survey performed with the assistance of an approved diving firm may be recognized as a substitute for every second periodical dry-docking survey, see [C.1.7](#).

**1.7.2** On request an in-water survey in lieu of every second periodical dry-docking survey may also be carried out for ships without the class notation **IW** with the assistance of an approved diving firm. The relevant permission will be endorsed in the annex to the class certificate.

**1.7.3** In general, bottom survey for seagoing ships with accommodation for more than 12 passengers shall be carried out in dry-dock. The final permission for substitution with an In-water survey is subject to GL Head Office approval and is valid for one substitution only. More extensive Flag State Requirements regarding the substitution of the bottom survey in dry-dock shall be observed, see [1.6.4](#) and [C.1.1.1.3](#).

**1.7.4** Special consideration should be given to vessels of 15 years of age or over prior to permission being granted to carry out an in-water survey in lieu of a dry-docking survey.

**2. Non-periodical surveys****2.1 Damage and repair surveys**

Damage and repair surveys fall due whenever the ship's hull, machinery or electrical installations and/or some special equipment classed have suffered a damage, which might affect the validity of the class, or if damage may be assumed in consequence of an average or some other event, see C.3.1 and Section 2, B.2.

**2.2 Voyage Repairs and Maintenance**

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

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

**2.3 Conversion surveys**

In the case of conversions of a ship's hull or machinery, surveys are to be conducted in accordance with the relevant approved particulars, as in the case of new buildings, see Section 2, B.3.

**2.4 Extraordinary Surveys**

GL reserve the right to require Extraordinary Surveys to be held independently of any regular surveys. Such surveys may become necessary for examining a vessel's technical condition and are understood to form a part of the Society's Quality Assurance System.

**3. Special equipment**

Periodical surveys and tests of special equipment covered by the class, such as diving installations, fire-fighting installations, incinerators or sea-water desalination systems, are to be carried out in accordance with the respective programmes fixed or to be fixed by GL for such special equipment characteristic of a particular type of ship.

For refrigerating installations see D.

For diving installations see E.

For lifting appliances see Construction Rules VI – Additional Rules and Guidelines, Part 2 – Lifting

Appliances, Chapter 5 – Preliminary Rules for the Classification of Lifting Appliances.

**4. Additional Safety Measures**

**4.1** For all ships the strength of the small hatches and their securing devices fitted on the exposed fore deck, are to comply with additional requirements <sup>2</sup> for these structures.

The strength requirements to resist sea forces of items, such as air and ventilator pipes and their closing appliances, and the securing of windlasses located within the forward quarter length, are to comply with additional requirements <sup>3</sup> for fore deck fittings and equipment.

Compliance is required in accordance with the following schedule:

- for all ship types of seagoing service of length 80 m or more, which are contracted for constructions on or after 1 January 2004, the requirements apply on the exposed deck over the forward 0,25 L, where the height of the exposed deck in way of the small hatch deck fittings and/or equipment is less than 0,1 L or 22 m above the summer load waterline, whichever is the lesser. Such ships, are to comply by the time of delivery
- for bulk carriers, general dry cargo ships and combination carriers, such as OBO ships, Ore/Oil carriers, etc. of length of 100 m or more, which are contracted for construction prior to 1 January 2004, the requirements apply only for small hatches and for air pipes and ventilator pipes on the exposed deck giving access to or serving spaces forward of the collision bulkhead, and to spaces which extent over this line aftwards. Such ships are to comply:
  - for ships which will be 15 years of age or more on 1 January 2004 by the due date of the first intermediate or Class Renewal Survey after that date
  - for ships which will be 10 years of age on 1 January 2004 by the due date of the first Class Renewal Survey after that date
  - for ships which will be less than 10 years of age on 1 January 2004 by the date on which the ship reaches 10 years of age.

Completion prior to 1 January 2004 of an intermediate or Class Renewal Survey with a due date after 1 January 2004 cannot be used to postpone compliance. However, completion prior to 1 January 2004 of

<sup>2</sup> Additional requirements see UR S 26 of IACS

<sup>3</sup> Additional requirements see UR S 27 of IACS



an intermediate survey the window for which straddles 1 January 2004 can be accepted.

## C.      Performance and Scope of Surveys

### 1.      Periodical Surveys

#### 1.1      Annual surveys

##### 1.1.1      General

**1.1.1.1** Unless a dry-docking survey is due, annual surveys as per [B.1.1](#) may be carried out with the ship afloat.

**1.1.1.2** The following applies to seagoing ships in general. [Section 4](#) for special ship types is to be observed.

**1.1.1.3** For ships with accommodations for more than 12 passengers, the annual surveys must always include a bottom survey. If requested by the owner, the final permission for substitution with an In-Water survey is subject to Flag State Administration and GL Head Office approval and this shall be valid for one substitution only, see [B.1.6.4](#).

##### 1.1.2      Hull, equipment

**1.1.2.1** The main structural elements of the hull are to be subjected to a general visual inspection, as far as accessible, on the occasion of the annual survey. Cargo holds and engine rooms are to be surveyed at random, depending on the ship type and the age and condition of the ship. The ship is to be surveyed in unloaded condition, wherever possible. In the case of suspected damages affecting the class, the Surveyor is entitled to carry out further investigations.

**1.1.2.2** The hatches, bulkhead doors, ramps, bow visors, bow, side and stern doors, etc., of all ships have to be surveyed at each opportunity arising, but at least once a year, regarding the tightness and operability of all closures.

Additionally to the overall-survey the following structural members of visors and doors are to be thoroughly inspected:

- all hinges and the pertinent hydraulic cylinders in way of their securing points
- all securing elements of the locking devices and stoppers

Bow, side and stern doors with a clear opening of less than 12 m<sup>2</sup> are to be checked as per the surveyor's instructions for their operability and unobjectionable technical condition. Car decks are to be surveyed in respect of operational safety, technical condition and accident prevention.

**1.1.2.3** The steering gear and the anchor equipment are to be checked for visible damages. For operability, see [1.1.3](#).

**1.1.2.4** If parts of the cargo hold area are discharged with grabs, these areas are to be surveyed, respectively the survey is to be extended to the discretion of the surveyor.

**1.1.2.5** On ships equipped for carriage of containers, the annual survey shall include random checks of

- condition and origin/identity of (loose) lashing/securing elements, against documentation on board (approved container stowage plan)
- condition of container supports welded into the ship's structure or the hatch covers

**1.1.2.6** For seawater ballast tanks, in the case of substantial corrosion<sup>4</sup> damages, annual surveys may be required, see [1.2.2](#).

**1.1.2.7** Passenger vessels: in addition to the annual surveys prescribed for all seagoing ships and the surveys to be conducted during dry-docking, all closures on the weather deck, the watertight bulkheads, including all closures, all bow visors, bow, side and stern doors, fire doors and similar closures, the escapes and any cross-flooding arrangements are to be checked every year as to their general condition and operability. All elevators and escalators are to be surveyed and tested annually, respectively.

##### 1.1.3      Machinery

The machinery, including the electrical installations, will be subjected to the following surveys and operational checks:

- general inspection of the machinery and boiler rooms, with special regard to the propulsion system, the auxiliary engines, fire and explosion sources, and checking of emergency exits as to their free passage
- external inspection of boilers, pressure vessels with their appliances and safety devices
- inspection and checking of the remote control, quick-closing/stopping devices of pumps, valves, ventilators, etc.
- random checking of the remote control and automation equipment
- inspection and checking of the main and auxiliary steering gear, including their appliances and control systems

<sup>4</sup> "Substantial Corrosion" is an extent of corrosion such that assessment of corrosion pattern indicates wastage in excess of 75 % of allowable margins, but within acceptable limits.

- checking of all communication systems between bridge and machinery, boiler and steering gear rooms
- inspection of the bilge system, including remote control actuators and bilge filling level monitor
- checking of the main and emergency power supply systems, including the switch-gear and other electrical installations
- survey of explosion-proof installations
- checking of further permanently installed installations to the Surveyor's discretion, e.g. provision cooling plant, air conditioning, incinerating plant, etc.

#### 1.1.4 Fire extinguishing and fire alarm systems

The following is subject to inspection/testing:

- fire mains system, including hoses and nozzles
- gas fire extinguishing system
- dry powder fire extinguishing system
- foam fire extinguishing system
- sprinkler system, including water mist sprinkler systems
- drencher system
- any other fixed fire extinguishing system
- portable fire extinguishers, mobile fire extinguishers, including portable foam applicator units
- fire detection and alarm systems
- emergency stop for ventilating fans, boiler forced draft fans, fuel transfer pumps, fuel oil purifiers, thermal oil pumps
- quick-closing fuel valves
- fire closures (fire dampers, engine room skylights)
- fire man's outfits
- fire fighting systems of ships with the class notation **FF1**, **FF2** or **FF3**

#### Note<sup>5</sup>

*At least 20 % of the available fire hoses and nozzles are to be included in the testing of the fire main system.*

*CO<sub>2</sub>-gas and halon cylinders of fixed gas fire extinguishing systems are subject to level checks every 2 years. These checks may be performed by ship's staff, provided that the results are recorded and an entry is made into the ship's log.*

*In the event of loss of more than 10 % of CO<sub>2</sub>, respectively more than 5 % of halon, recharging is to be arranged for. For periodical testing see [Section 3, B.1.5.5.3](#).*

*Fixed fire extinguishing systems, such as gas-, foam-, dry powder, water spray or water mist fire extinguishing systems are subject to maintenance by approved specialists every 2 years.*

*On the occasion of these inspections all CO<sub>2</sub> hose assemblies must be subjected to a visual check. All CO<sub>2</sub> hose assemblies made of synthetic rubber must be replaced by type approved CO<sub>2</sub> hose assemblies not later than 10 years from the date of manufacture.*

*Portable fire extinguishers and mobile fire extinguishers are subject to inspection by a competent person every year. Maintenance shall be carried out as appropriate in accordance with the manufacturers' instructions. Each extinguisher is to be provided with a label showing the date of inspection and name and signature of the competent person.*

*Fire extinguishers and associated propellant gas cylinders if any are subject to pressure testing every 10 years.*

*A protocol of the inspections and maintenance carried out is to be kept onboard.*

*Foam concentrate for fixed foam fire extinguishing systems is to be examined not later than 3 years after filling into the system, and yearly thereafter. The examination is to be performed by the manufacturers or by an independent laboratory. Reports are to be presented to the Surveyor. Manufacturers' certificates stating the properties of the foam concentrate shall be available onboard for reference of the Surveyor.*

*The foam concentrate for the portable foam applicators is to be renewed on the occasion of every class renewal.*

#### 1.1.5 Bridge control stand

On the occasion of the annual survey or during the prescribed annual survey of the safety equipment onboard ships assigned the class notation **NAV-O** or **NAV-OC**, an operational trial of the relevant equipment is to be performed.

### 1.2 Intermediate surveys

#### 1.2.1 General

**1.2.1.1** Intermediate surveys are to be performed to the extent of annual surveys. Additionally, the following requirements are to be observed.

**1.2.1.2** The requirements listed below apply to sea-going ships in general. [Section 4](#) for special ship types is to be observed.

<sup>5</sup> More extensive regulations of the Flag State Administration regarding other inspection intervals / performance of the tests should be observed.

### 1.2.2 Ballast tanks

**1.2.2.1** In ships aged 5 to 10 years, selected seawater ballast tanks are to be examined for corrosion damages and/or damages to their coatings. Depending on the survey result, and in particular in the case of poor coating condition,<sup>6</sup> if soft coating<sup>7</sup> has been applied, or if when built the tanks were not provided with effective corrosion protection, the survey is to be extended to additional tanks of the same type.

**1.2.2.2** If the coating in seawater ballast tanks except the double bottom tanks is found to be in poor condition, but is not renewed, if soft coating has been applied, or if when built, the tanks were not provided with effective corrosion protection, or if corrosion respectively other defects are found, maintenance of class is to be subject to the tanks in question being examined at annual intervals, and thickness measurements carried out as considered necessary.

Also in case of double bottom tanks, annual surveys may have to be carried out.

**1.2.2.3** In ships aged 10 years and over, during the intermediate survey, all seawater ballast tanks are to be examined for damages to the hull structural elements and to the coating, if applicable the procedure as outlined in 1.2.2.2 shall be followed.

**1.2.2.4** If coating is to be renewed totally or partly, only approved coating is applicable in case of a repair. The whole working procedure including the surface preparation has to be documented.

### 1.2.3 Cargo holds

Depending on the ship's age and on the cargo carried, selected cargo holds are to be closely examined in accordance with the Surveyor's instructions in order to ensure that the condition of all important structural elements may be ascertained.

### 1.2.4 Bow visors and bow side and stern doors

Structural members inspected thoroughly as per C.1.1.2.2 are to be additionally crack tested.

Essentially, the crack tests will cover:

- main joining welds and their interfacial areas both on the vessel's hull and on the visor and/or doors
- highly stressed areas in way of the centres of rotation of the hinges, at the Surveyor's discretion

<sup>6</sup> Poor condition: breakdown of coating over 20 % or more of areas, or hard scale at 10 % or more of areas under consideration.

<sup>7</sup> "soft coating" means: Solvent-free coating on base of wool grease, grease, mineral oils and / or wax that remains soft so that it wears off when touched.

- highly stressed areas of the locking devices and their stoppers, at the Surveyor's discretion
- repair welding

For crack detection the dye penetration method or the magnetic particle inspection method shall be employed, and a test protocol is to be prepared.

### 1.2.5 Elastic mounting of deck houses

Elastic mountings of deckhouses have to be thoroughly checked for the general condition and operability of:

- the spring elements (possibly pre-stressing of screwed connections)
- the insulation
- the securing devices to prevent shifting and lifting
- the pipe and cable connections to the hull

If damages are suspected, mountings not easily accessible are to be dismantled and examined in detail.

### 1.2.6 Machinery and electrical installations

**1.2.6.1** The following **measurements** are to be performed and/or proved to have been performed by up-to-date protocols:

- crank web deflection, main engine(s)
- crank web deflection, auxiliary diesel(s) (where relevant)
- axial thrust bearing clearance of shafting system(s)
- axial thrust bearing clearance of main and auxiliary turbine rotors
- insulation resistance of generators and essential electrical motors, including cabling and switchgear

**1.2.6.2** Additionally, the following system components are to be subjected to **operation tests**:

- emergency generating set, including emergency switchboard
- emergency bilge valve
- bilge, ventilation and monitoring systems for the carriage of dangerous goods
- drainage facilities of starting-air and control-air receivers
- general operational test of the machinery and electrical installations for furnishing proof of unrestricted operability, as indicated by the Surveyor

**1.2.6.3 Automation equipment**

In case a survey is due, the automation equipment is to be checked according to [1.5.6](#).

**1.3 Class renewal surveys****1.3.1 General**

**1.3.1.1** In addition to the surveys and checks to be carried out as outlined in [1.1](#) and [1.2](#), on the occasion of class renewals, the following regulations are to be observed.

**1.3.1.2** The requirements listed below apply to sea-going ships in general. [Section 4](#) for special ship types is to be observed.

**1.3.1.3** The class renewal survey is as a rule to be held when the ship is in dry-dock or on a slipway, unless a dry-docking survey has been carried out within the admissible period (see [B.1.6.7](#)). The ship is to be placed on blocks of sufficient height so that the keel, the bottom plating and the rudder can be examined.

**1.3.2 Hull, equipment****1.3.2.1 Class Renewal I**

(Age of ship up to 5 years)

**1.3.2.1.1 Hull, general**

At the surveyor's discretion, the survey on principle covers the hull structural elements, particularly those areas which from experience are known to be exposed to fatigue and corrosion, such as cargo holds, tanks, hatch structure, bow visors, bow, side and stern doors, engine foundations, ends of superstructures. As a matter of principle, all spaces, such as pump rooms, pipe tunnels, machinery spaces, dry spaces, cofferdams and voids are to be internally examined, including the piping system.

**1.3.2.1.2 Preparations**

The cargo holds, the bilges and the tanks are to be cleared, cleaned and – if necessary – freed from gas at the Surveyor's discretion so that all structural parts, such as frames, floor plates, stringers, shell plating, decks, deck beams, bulkheads, inner bottom, etc. may be examined. Tanks for fuel oil, lubricating oil and fresh water, see [1.3.2.1.3](#).

Where ships have no double bottom, it is left to the Surveyor's discretion to have portions of the bottom ceiling of each watertight compartment removed on either side of the ship, especially near the centre-line girder and in way of the bilge pipes and sounding pipes, so that the bottom structure below may be examined.

Where ships have a double bottom, the ceiling is to be removed at several points, at the Surveyor's discretion.

If deemed necessary by the Surveyor, defective cement and asphalt covering is to be removed. The steel work is to be examined before painting or before the cement or other coverings are renewed.

**1.3.2.1.3 Tanks**

The seawater ballast tanks are to be inspected at the Surveyor's discretion; if applicable the procedure as outlined in [1.2.2.2](#) shall be followed.

Fuel oil, lubricating oil and fresh water tanks need not be emptied, if their tightness can be verified by an external examination while they are completely filled and there is no reason for doubt as to their unobjectionable condition. However, fore peak and after peak are in any case subject to internal examinations at each Class Renewal Surveys, see also [Table 3.1](#)

**1.3.2.1.4 Tightness tests**

Each compartment of the double bottom and all tanks, the boundary bulkheads of which form part of the main structure of the ship, are to be subjected to a pressure test. Fuel, lubricating oil and fresh water tanks may be tested by filling with the respective liquid.

The test pressure applied is to correspond to a head of water up to the top of the hatch for cargo tanks or up to the top of the overflow/air pipe of a tank, whichever is higher.

The tightness of pipe tunnels outside the inner bottom, and of void spaces, can be tested by air pressure. Testing of other tanks, by air pressure, is to be agreed with the surveyor from case to case. The overpressure must not exceed 0.2 bar.

**1.3.2.1.5 Thickness measurements**

If the Surveyor has reason to suspect premature inadmissible corrosion, he may require the rust to be removed from parts of the structure and thickness measurements to be performed, see [2](#).

**1.3.2.1.6 Rudder, equipment, deck openings, etc.**

The class renewal survey also covers other parts essential for the operation and safety of the ship, such as rudder and steering gear, watertight doors, sluice valves, air and sounding pipes, gas-freeing and safety arrangements of cargo tanks, life-boat davits, skylights, companionways, hatches, scuppers and water drain pipes with their valves, fire protecting arrangements, masts, anchors, anchor chains and hawsers.

Visors and doors, if any, are to be checked, see [1.2.4](#).

Elastic mountings of deck houses, if any, are to be checked, see [1.2.5](#).

For trials of the steering gear and possible dismantling of the rudder, see [1.1.3](#) and [1.6.3](#).

#### 1.3.2.1.7 Engine room

The engine room structure is to be examined. Particular attention is to be given to tank tops, shell plating in way of tank tops, brackets connecting side shell frames and tank tops, and engine room bulkheads in way of tank top and bilge wells. Where wastage is evident or suspected, thickness measurements are to be carried out.

#### 1.3.2.1.8 Container ships

For ships equipped for the carriage of containers, the following scope of survey is required for class renewal:

- checking for cracks and deformations of the container supporting elements (weld-in elements) in the inner bottom and in hatch covers, of supporting stanchions arranged on deck, if any, and of the entire hatch covers
- hatch covers: Checking of condition and operability of supports and stoppers
- survey of guide rails and supporting frames if fitted (connection to hull, deformations)
- random checking of the (loose) stowage and lashing elements, comparison with the certificates kept in the ship's files

#### 1.3.2.1.9 Loading instruments and loading manual

Where necessary for the vessel, at each Class Renewal, the satisfactory operation of the approved loading instrument is to be tested in the presence of a GL Surveyor using the approved test conditions.

At least 3 test conditions are to be checked, and the results may not deviate from the approved figures by more than 5 %.

The weights of the cargo, ballast, fuel etc. are to be read in step by step.

Where necessary for the vessel, the Surveyor has to check that the approved Loading Manual is on board.

#### 1.3.2.2 Class Renewal II

(Age of ship 5 to 10 years)

**1.3.2.2.1** The requirements of Class Renewal II are identical to those of Class Renewal I; however, the requirements listed below are to be observed additionally.

**1.3.2.2.2** The structural parts behind ceilings and insulation are to be examined as required by the Surveyor.

**1.3.2.2.3** In principle, all tanks are to be examined internally. Lubricating oil and fresh water tanks are to be subjected at least to random examinations as required by the Surveyor, see also Table 3.1.

In the case of seawater ballast tanks the procedure as outlined in 1.2.2.2 shall be followed, if applicable.

**1.3.2.2.4** The chain cables are to be ranged so that they can be examined for wear and damages throughout their length. The mean diameter of the anchor chain cables is to be determined on at least 3 links per length.

**1.3.2.2.5** For thickness measurements see 2.

#### 1.3.2.3 Class Renewal III and subsequent ones

(Age of ship over 10 years)

**1.3.2.3.1** For Class Renewals III and subsequent ones the requirements of Class Renewal II are to be complied with; however, the requirements listed below are to be observed additionally.

**1.3.2.3.2** Ceilings and insulation of holds are to be removed, where necessary, to enable the condition of the bottom structure and the inner surfaces of the shell plating or of the tank tops to be assessed. For Class Renewals IV and subsequent ones the bottom ceilings of cargo holds are to be completely removed and the tank top is to be carefully cleaned, such as to enable proper assessment of their condition.

**1.3.2.3.3** The wall lining underneath windows in the outer shell is to be lifted as required by the Surveyor so that the structure behind may be examined.

**1.3.2.3.4** All tanks are to be examined internally. The fuel, lubricating oil and fresh water tanks are to be examined internally and tested to the maximum working overpressure, at the surveyor's discretion, see 1.3.2.1.3 and Table 3.1. In the case of seawater ballast tanks the procedure as outlined in 1.2.2.2 shall be followed, if applicable.

**1.3.2.3.5** Cargo tanks of dry cargo vessels are to be tested by filling with water to the level of the upper edge of the tank hatch, or if this is not possible, by air pressure (max. 0.2 bar overpressure).



**Table 3.1 Minimum requirements for internal examination at Hull Class Renewal Surveys of structural fuel oil, lube oil and fresh water tanks**

Class renewal survey [No.] and ship's age [years]				
Tank <sup>1, 2</sup>	I. age ≤ 5	II. 5 < age ≤ 10	III. 10 < age ≤ 15	IV. and subsequent, age > 15
Fuel Oil Bunkertanks				
– Engine Room	None	None	One	One
– Cargo Area	None	One	Two <sup>3</sup>	Half, minimum two <sup>3</sup>
Lube Oil	None	None	None	One
Fresh Water	None	One	All	All
<sup>1</sup> 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 <sup>2</sup> Fore peak tanks and after tanks are subject to internal examination at each Class Renewal Survey <sup>3</sup> One deep tank is to be included, if fitted				

**1.3.2.3.6** The rudder body is to be examined. The connections to the rudder stock and, if fitted, to the pintle and pertinent securing devices are to be inspected. For clearances, see 1.6.3.

As far as accessible, the rudder stock is to be surveyed. If deemed necessary in view of the findings of the external inspection, the stock is to be dismantled. In way of the bearings, as far as accessible, stock and pintle are to be examined for corrosion.

**1.3.2.3.7** The weight of the anchors is to be checked.

### 1.3.3 Machinery including electrical installation

#### 1.3.3.1 General

Except for individual machinery items as indicated in 1.5, the scopes of all class renewal surveys for the machinery installation, including the electrical installation, are identical. If the continuous class renewal system is applied, B.1.3.6 is to be observed.

#### 1.3.3.2 Surveys requiring dry-docking

While the ship is in dry-dock, the sea inlet and discharge valves are to be examined as to their condition and to be opened up and overhauled once within a period of class.

Bow thrusters and positioning equipment are to be subjected to a general survey, and to trials, upon floating of the ship.

If vessels are equipped with scoops, these are also to be covered by the survey.

For propellers, propeller and stern tube shaft, vane wheels, see 1.4.

#### 1.3.3.3 Propulsion system

**1.3.3.3.1** Inspections of the propulsion system are to mainly cover:

- intermediate shafts and bearings, including thrust bearings
- gearing
- mechanical and flexible couplings
- turning gear, and
- the main propulsion engines, see 1.3.3.4, 1.3.3.5 and auxiliary engines, see 1.3.3.6

For electrically driven propellers, see 1.3.3.8.

**1.3.3.3.2** Spring elements made of rubber – with or without plies of fabric – of rubber ring clutches with or without plies of fabric and under shear load, and other rubber or fibre reinforced, couplings, are to be renewed, if required on account of negative inspection results.

#### 1.3.3.4 Main propulsion engines

The components listed below are to be inspected and, where deemed necessary by the Surveyor, checked in dismantled condition:

- cylinders, cylinder covers, pistons, piston rods and bolts, cross heads, crankshaft and all bearings
- camshaft, with drive and bearings
- tie rods, frame, and foundation and fastening elements
- injection system, attached pumps and compressors, superchargers, suction and exhaust lines, charging air coolers, filters, monitoring, con-

trol, protective and safety devices, starting, reversing and manoeuvring equipment

**Note**

*In the case of medium-speed diesel engines, dismantling and replacement of main and crank bearings may be postponed until the service life limits have been reached. The acceptable intervals between overhauls are determined by GL Head Office.*

**1.3.3.5 Main propulsion turbines**

On the occasion of each class renewal the vibration behaviour of the main propulsion turbines is to be proved, possibly by regular checks during operation. Depending on the result obtained and as required by the Surveyor, the turbine casings will have to be opened up.

The safety devices of the turbines are to be tested.

**1.3.3.6 Auxiliary engines**

For all essential auxiliary engines, the survey scope is identical to that applying to main engines. A reduction in the scope of survey may be agreed to upon examination of the maintenance protocols.

**1.3.3.7 Auxiliary machinery, equipment and piping**

The following machinery components are, if deemed necessary by the Surveyor, to be inspected and tested in the dismantled condition:

- all pumps of the essential systems
- air compressors, including safety devices
- separators, filters and valves
- coolers, pre-heaters, see [1.5.5](#)
- main and auxiliary steering gear
- anchor and other windlasses, including their drives
- piping, pipe connections, compensators and hoses
- emergency drain valves and bilge piping systems
- tank filling level indicators
- installations preventing the ingress of water into open spaces
- freshwater distillation plant
- oil purifier and sewage systems and
- additional systems and components, where deemed necessary by the Surveyor

**1.3.3.8 Electrical installations**

**1.3.3.8.1** If the ship is propelled by electric machinery, the propulsion motors, the propulsion generators,

exciters, particularly the windings of these machines and their ventilating systems are to be examined and tested. Checking of the electric switch gear for operability is to also cover the protective, safety and interlocking devices. The electric cables and their connections are to be inspected. The insulation resistance of all electric machinery and equipment is to be tested.

**1.3.3.8.2** Dynamic positioning systems according to [Section 2](#), [C.3.1.9](#) including control systems, are to be subjected to operational tests.

**1.3.3.8.3** The electrical equipment, including the generators, the motors of the essential auxiliary machinery, the switch gear, including its protective and interlocking devices, as well as the cable network, is to be inspected externally. The insulation resistance is to be measured.

**1.3.3.8.4** Electrical installations, including machinery and equipment, located in spaces in which there is a risk of inflammable gas or vapour air mixtures accumulating, are to be checked as to the explosion protection provided.

**1.3.3.9 Pipes in tanks**

Where pipes lead through tanks, they are to be examined and, if required by the Surveyor, subjected to hydraulic tests, if for such tanks an internal examination is required by [1.3.2](#). Depending on the results obtained, thickness measurements are to be performed.

**1.3.3.10 Fire extinguishing and fire alarm systems**

**1.3.3.10.1 General requirements**

Proof is to be furnished to the Surveyor of the entire fire extinguishing equipment being ready for operation. Details/ trials as per [1.1.4](#).

Emergency exits/escapes are to be inspected.

CO<sub>2</sub> cylinders and halon bottles: see [1.5.5](#) and for due dates, [B.1.5.5](#).

On the occasion of every class renewal survey all CO<sub>2</sub> hose assemblies must be subjected to a visual check. All CO<sub>2</sub> hose assemblies made of synthetic rubber must be replaced by type approved CO<sub>2</sub> hose assemblies not later than 10 years from the date of manufacture.

**1.3.3.10.2 Fire-fighting ships**

The fire-fighting and life-saving equipment aboard ships with notations **FF1**, **FF2** or **FF3** affixed to their character of classification for the machinery installation are to be inspected and tested.

Positioning equipment, see [1.3.3.2](#), [1.3.3.8](#).

**1.3.3.11** Automation equipment see [1.5.6](#).

**1.3.3.12 Dangerous goods**

In ships carrying the class notation **SOLAS II-2, Reg. 19** the equipment for the carriage of dangerous goods, e. g., special fire fighting, alarm, ventilation and explosion protection equipment is to be surveyed as required.

**1.3.3.13 Spare parts**

Spare parts are to be checked for completeness as per the Rule requirements and/or according to the lists approved by GL and kept in the ship's files, as well as for their operability.

**1.3.3.14 Trials**

Upon completion of the surveys for class renewal, the Surveyor must be satisfied that the entire machinery installation, including the electrical machinery and equipment and the steering gear, is operable without any restrictions. In case of doubt, this may have to be proved by trials and/or operational tests.

**1.4 Periodical surveys of propeller shafts and tube shafts, propellers, vane wheels and other systems**

The periodical surveys and tests of propeller shafts and tube shafts, propellers, vane wheels and other systems defined in B.1.4 are to be performed as follows.

**1.4.1 Propeller shafts and tube shafts****1.4.1.1 Normal survey**

The prerequisites are defined in B.1.4.1.1. It is distinguished between:

- survey with drawing of the shaft
- survey without drawing of the shaft

**1.4.1.1.1 Survey with drawing of the shaft**

The scope of normal survey consists in the following:

- dismantling of propeller and key, where fitted, visual inspection of all parts of the shaft especially the cone, the keyway, the bearing contact areas of the shaft, the bearings, and the thread of the propeller nut, or the fillet of the flange, examination of the propeller fit
- non-destructive examination by an approved crack-detection method of the aft end of the cylindrical part of the shaft and of about one third of the length of the taper from the large end and of the area of the keyway, or the fillet of the flange in case of a solid flange coupling
- examination of the bearing clearances and/or wear down before dismantling and after reassembling of the shaft with recording of the values measured

- overhaul of the shaft sealing glands according to manufacturer's instructions (sealing rings, liners, etc.)

**1.4.1.1.2 Survey without drawing of the shaft**

Where the prerequisites as defined in B.1.4.1.1.2 apply, for oil lubricating arrangement the scope of normal survey without drawing of the shaft consists in the following:

- examination of all accessible parts of the shaft including the propeller connection to the shaft
- non-destructive examination by an approved crack-detection method of the aft end of the cylindrical part of the shaft and of about one third of the length of the taper from the large end and of the area of the keyway for keyed propellers, or of the forward part of the aft shaft taper for keyless propellers, or of the after fillet flange area of the shaft for solid flange coupling propellers.

The area to be examined is to be sufficiently exposed, if necessary by shifting of the propeller shaft or backing-off of the propeller

- examination of the bearing clearances, respectively wear down of the aft bearing
- overhaul of the shaft sealing glands according to manufacturer's instructions (sealing rings, liners, etc.)
- examination of the records of all regularly carried out lubricating oil analyses
- examination of the records of the oil consumption and the bearing temperatures

Where doubts exist regarding the findings, the shaft is to be drawn to permit an entire examination.

**1.4.1.2 Modified survey**

The prerequisites are defined in B.1.4.1.2. It is distinguished between:

- survey with exposing the aft bearing contact area of the shaft
- survey without exposing the aft bearing contact area of the shaft

**1.4.1.2.1 Survey with exposing the aft bearing contact area of the shaft**

The scope of the modified survey consists in the following:

- drawing the shaft to expose the aft bearing contact area of the shaft
- examination of the forward bearing as far as possible and of all accessible parts of the shaft including the propeller connection to the shaft

- examination and overhaul of the oil sealing glands according to manufacturer's instructions (sealing rings, liners, etc.)
- examination of the bearing clearances and/or wear down of the shaft with recording of the values measured
- examination of the lubricating oil analysis and consumption to be within permissible limits
- for keyed propellers, performing a non-destructive examination by an approved crack-detection method of about one third of the length of the taper from the large end, for which dismantling of the propeller is required, examination of the propeller fit

Where doubts exist regarding the findings, the shaft is to be further dismantled, respectively drawn.

#### **1.4.1.2.2 Survey without exposing the aft bearing contact area of the shaft**

Where the prerequisites as defined in B.1.4.1.2.2 apply, the scope of the modified survey without exposing the aft bearing contact area of the shaft consists in the following:

- examination and overhaul of the oil sealing glands according to manufacturer's instructions (sealing rings, liners, etc.)
- examination of the bearing clearances and/or wear down of the shaft with recording of the values measured
- for keyed propellers, performing a non-destructive examination by an approved crack-detection method of about one third of the length of the taper from the large end, for which dismantling of the propeller is required, examination of the propeller fit

In addition to this the survey shall include the following:

- examination of the records of all regularly carried out lubricating oil analyses
- examination of the records of the oil consumption and the bearing temperatures

Where doubts exist regarding the findings, the shaft is to be further dismantled, respectively drawn.

#### **1.4.1.3 Partial survey**

The prerequisites are defined in B.1.4.1.3. The partial survey consists in the following:

- checking of the oil sealing for leakages
- examination of the bearing clearances and/or wear down of the shaft with recording of the values measured
- examination of the records of the lubricating oil analysis

- examination of the records of the oil consumption and the bearing temperatures

Where the propeller is fitted to a keyed shaft taper, in addition:

- dismantling of the propeller and examination of propeller fit
- non-destructive examination by an approved crack-detection method of the aft end of the cylindrical part of the shaft and of about one third of the length of the taper from the large end and of the area of keyway

are to be performed.

Where doubts exist regarding the findings, the shaft is to be further dismantled, respectively drawn.

### **1.4.2 Propellers**

Propellers are to be examined visually on the occasion of each propeller shaft or tube shaft survey.

Damages, such as cracks, deformation, cavitation effects, etc. are to be reported and repaired at the Surveyor's discretion.

Controllable pitch propellers are to be checked for oil leakages. The function of the controllable pitch propellers has to be tested. The maintenance according to manufacturer's instructions has to be checked.

### **1.4.3 Vane wheels**

The scope of surveys is to be agreed with GL Head Office.

### **1.4.4 Other systems**

As far as practicable, the gearing and control elements of rudder and steering propellers are to be examined through inspection openings. For other systems such as pod propulsion systems, pump jet units, etc. the scope of survey is to be agreed with GL Head Office. The maintenance according to manufacturer's instructions is to be checked. A function test is to be carried out.

## **1.5 Periodical surveys and tests of individual machinery items**

**1.5.1** The periodical surveys and tests of individual machinery items defined in B.1.5 are to be performed as outlined below.

### **1.5.2 Steam Boilers**

#### **1.5.2.1 External inspection**

The operability and general condition of the entire boiler, including its valves and fittings, pumps, piping, insulation, foundation, control and regulating systems, and its protective and safety equipment, are to be examined. Also, the boiler manual, operating

instructions and qualifications of the boiler operator are to be checked (for German flag ships).

#### 1.5.2.2 Internal inspection

Where deemed necessary by the Surveyor, the boiler is to be cleaned on the water and flue gas sides, and, if required, its outside surfaces are to be exposed as well, so that all walls subject to pressure may be examined.

Where the design of the boiler does not permit an adequate internal inspection, hydraulic tests may be required. It is left to the Surveyor's discretion to have the internal inspection supplemented by hydraulic tests, if required on account of the condition of the boiler.

Where there are doubts concerning the thickness of the boiler walls, it is to be ascertained by means of a recognized gauging method. On the basis of the result of such inspection the allowable working pressure at which the boiler may be operated in future is to be decided on.

The hydraulic pressure test is to be carried out to a test pressure of 1.3 times the allowable working pressure. Only after repair of major damages the test pressure shall be 1.5 times the maximum allowable working pressure. If the maximum allowable working pressure is less than 2 bar, then the test pressure should be at least 1 bar more than the maximum allowable working pressure. In no case the test pressure should exceed the test pressure applied during the first inspection of the boiler after completion.

**1.5.2.3** Beyond the above periodical inspections the Surveyor may at his own discretion require hydraulic tests or extraordinary surveys to be performed, e. g. following repairs and maintenance work.

#### 1.5.3 Thermal oil plants

##### 1.5.3.1 External inspection

Thermal oil plants are to be subjected to functional tests, while in operation. In detail, the following items are to be examined:

- the entire thermal oil plant for leakages
- the condition of the insulation
- the functioning of the indication, control and safety equipment
- the remote controls for the shut-off and discharge valves
- the leakage monitors for the heaters
- the emergency switch-off devices (oil firing, pumps)
- the safety switch-off devices for the oil burner
- lighting, emergency lighting and labelling

Reference is to be made to the test reports on the annual checks to be performed by an appropriate testing institution for continued use of the thermal oil. This is to be confirmed in the report.

##### 1.5.3.2 Internal inspection

During the internal inspection the heating surfaces and, where appropriate, the combustion chamber, are to be examined for contamination, corrosion, deformations and leakages. As a rule, tightness tests are to be carried out to the admissible working pressure. Following repairs and renewals of plant components exposed to pressure, a pressure test is to be carried out to 1.5 times the admissible working pressure.

#### 1.5.4 Steam pipes/heating coils

**1.5.4.1** Steam pipes with steam temperatures of up to 350 °C and with outside diameters of more than 75 mm, are to be examined at random. Examinations of the internal condition of the pipelines, especially of pipe bends, or additional more detailed examinations may be required. Instead of the internal inspection, a hydraulic test may be affected to a pressure equal to 1.5 times the design pressure, but not exceeding that of the prescribed test pressure for the pertinent boiler plant.

**1.5.4.2** In the case of steam pipes with steam temperatures exceeding 350 °C (at least two) selected individual parts of pipes are to be dismantled from each piping system (main steam pipe and auxiliary steam pipes of each service group) having an outside diameter exceeding 32 mm. Approximately 10 % of the welding seams at bends, flanges or tee-branches are to be subjected to an inspection for cracks by recognized non-destructive test methods.

Before being used again, removed screws of flanged joints are to be inspected for their general condition and cracks and renewed, if necessary.

**1.5.4.3** Steam pipes designed to resist steam temperatures exceeding 500 °C and welded piping systems are to be examined as follows:

Flanged pipes in accordance with 1.5.4.2; however, the inspection for cracks has to cover at least 20 % of the welded seams.

If internal examination of welded piping systems through the inspection holes appears to be inadequate or if their reliable assessment is not possible even by ultrasonic testing or an equivalent examination method, it may be necessary to cut out certain parts of pipes. At least 20 % of the welding seams are to be inspected for cracks.

Removed screws of flanged joints, see above 1.5.4.2.

**1.5.4.4** Heating coils in oil tanks and vessels are to be subjected to a pressure test to 1.5 times the allowable working pressure.

The same applies to heating coils in cargo tanks.



### **1.5.5 Pressure vessels**

**1.5.5.1** Subject to [B.1.5.5](#), pressure vessels are to be inspected internally and externally.

#### **1.5.5.2 Supplementary tests**

Where pressure vessels cannot be satisfactorily examined internally and where their unobjectionable condition cannot be clearly recognized during the internal inspection, recognized non-destructive test methods are to be applied and/or hydraulic pressure tests are to be carried out.

The hydraulic pressure test is to be performed at a test pressure of 1.5 times the maximum allowable working pressure. If the maximum allowable working pressure is less than 2 bar, then the test pressure should be at least 1 bar more than the maximum allowable working pressure. Pressure vessels manufactured in accordance with DIN Standard 4810 are, subject to that Standard, to be tested to 1.3 times the admissible working pressure. The test pressure must in no case exceed the initial test pressure.

#### **1.5.5.3 CO<sub>2</sub> low-pressure fire-extinguishing systems and halon tanks**

The surfaces are to be checked for corrosion at the Surveyor's discretion.

Insulated vessels are to be exposed at some selected points, such as to offer a general impression of the vessel's external condition.

Following a hydraulic pressure test, the vessels and/or bottles are to be carefully dried, see also [B.1.5.5.4](#).

### **1.5.6 Automation equipment**

The monitoring equipment and the automated functions of the machinery installation are to be subjected to operational trials under service conditions in port; the bridge remote control equipment of the propulsion system will be examined as required.

For details, see survey programme AUT 4.

## **1.6 Dry-docking surveys**

(seagoing ships)

### **1.6.1 General**

For the survey the ship is to be placed on sufficiently high and secure blocks, so that all necessary examinations can be carried out. It may be necessary to clean the bottom and outer shell and/or remove rust from some areas.

### **1.6.2 Hull (bottom survey)**

**1.6.2.1** The survey covers an examination of the bottom and side plates of the shell plating, including any attachments, of the rudder, the scuppers and water drain pipes, including their closures.

**1.6.2.2** For intermediate surveys of tankers, to be carried out in the form of dry-docking surveys, see [Section 4, A. to D.](#)

### **1.6.3 Steering gear**

The rudder, rudder couplings and bearings, as well as stocks and pintles, are to be surveyed in mounted condition, the rudder clearance is to be measured and documented. The steering gear is to be subjected to an operational trial. If considered necessary in view of the inspection results, the rudder or parts of the steering gear will have to be dismantled.

Bow thrusters are to be inspected externally, see [B.1.4.4](#).

### **1.6.4 Machinery and propulsion systems**

**1.6.4.1** For propellers, propeller shaft(s), stern tube, see [1.4.2](#).

**1.6.4.2** Sea and discharge valves - including those of special equipment, if any - are to be checked as to their condition during each dry-docking survey and to be opened up and overhauled once within a period of class.

## **1.7 In-water surveys**

### **1.7.1 Approvals**

**1.7.1.1** The diving firm assisting in in-water surveys must be approved by GL for this purpose.

**1.7.1.2** Validity of an approval granted will depend on the continued qualification for satisfactorily carrying out the work required. The approval will have to be renewed after a period not exceeding 5 years.

### **1.7.2 Performance of survey**

**1.7.2.1** Unless accessible from outside with the aid of the vessel's trim and/or heel, underwater parts are to be surveyed and/or relevant maintenance work is to be carried out with assistance by a diver whose performance is controlled by a Surveyor, using an underwater camera with monitor, communication and recording systems.

**1.7.2.2** Surveys of the underwater body are to be carried out in sufficiently clear and calm waters.

The ship should be in light ship condition.

The shell sides below the water-line and the bottom must be free from fouling.

**1.7.2.3** The underwater pictures on the surface monitor screen must offer reliable technical information such as to enable the Surveyor to judge the parts and/ or the areas surveyed.

**1.7.2.4** Documentation suited for video reproduction including voice is to be made available to GL.

### **1.7.3 Additional examinations**

**1.7.3.1** Where, for instance, grounding is assumed to have taken place, the Surveyor may demand individual parts of the underwater body to be additionally inspected from inside.

**1.7.3.2** If during the in-water survey damages are found which can be assessed reliably only in dry-dock or require immediate repair, the vessel is to be dry-docked. If the coating of the underwater body is in a condition which may cause corrosion damages affecting vessel's class to occur before the next dry-docking, the vessel is to be dry-docked.

## **2. Thickness measurements and corrosion tolerances**

### **2.1 General**

**2.1.1** The thickness of structural elements is checked by measurements, in order to assess whether or not the values stipulated in the Construction Rules are observed, taking into account the admissible tolerances. Unless severe corrosion has occurred owing to particular service conditions, thickness measurements will not be required until Class Renewal II, see [1.2.2](#) and [1.3.2.1.5](#).

**2.1.2** Thickness measurements are to be carried out in accordance with recognized methods, by authorized personnel or companies, see [2.2](#). Rust and contamination are to be removed from the components to be examined. The Surveyor is entitled to require check measurements or more detailed measurements to be performed in his presence. The thickness measurements on board are to be witnessed by the surveyor. This requires the surveyor to be on board while the gauging is taken, to the extent necessary to control the process.

The scope of thickness measurement as well as the reporting shall be fixed in a survey planning meeting between the surveyor(s), representatives of the owner and the approved thickness measurement operator/firm well in advance of measurements and prior to commencing the survey.

The Surveyor will verify with his stamp and signature on the final thickness measurement report that he has attended the thickness measurements taken, and has checked on completion of the thickness measurements the final report with the draft report submitted to him by the authorized operator/firm.

## **2.2 Authorization**

**2.2.1** The personnel or the company entrusted with thickness measurements (as well as the procedure for documentation) must be approved by GL for this purpose.

**2.2.2** Validity of an approval granted will depend on the continued qualification. The approval will have to be renewed after a period not exceeding 3 years.

## **2.3 Scope of measurements**

### **2.3.1 Main hull structural elements**

In Class Renewal II and all subsequent ones the plate thickness of the main hull (essential longitudinal and transverse) structural elements are to be checked by measurements. The number of measurements depends on the vessel's maintenance condition and is left to the Surveyor's discretion. The minimum requirements for thickness measurements on the occasion of class renewal surveys are stated in Table 3.2, depending on the ship's age. Respective thickness measurements to determine the general level of corrosion are to be carried out.

**2.3.2** The extent of thickness measurements may be reduced, in comparison with those stated in Table 3.2, provided during the close-up examination the Surveyor satisfies himself that there is no structural diminution, and the protective coating, where applied, continues to be effective.

The Surveyor may extend the scope of the thickness measurement as deemed necessary. This applies especially to areas with substantial corrosion.

Transverse sections should be chosen where largest corrosion rates are suspected to occur or are revealed by deck plating measurements.

### **2.3.3 Seawater ballast tanks**

In the case of major corrosion damages, the structural elements of seawater ballast tanks are to be checked by thickness measurements, see [1.2.2](#).

**2.3.4** Where special reasons exist, the Surveyor may demand thickness measurements to be carried out already on the occasion of Class Renewal I, also outside the area of 0.5 L amidships, see [1.3.2.1.5](#). The same applies in the case of conversion or repair of a ship.

**2.3.5** In order to be used as a basis for class renewal, thickness measurements should, as far as practicable, be carried out already on the occasion of the fourth annual survey.

### 2.3.6 Equipment

In Class Renewal II and all subsequent Class Renewals the cross sectional areas of the anchor chain cables and the weights of the anchors are to be determined. The mean diameters of the anchor chain cables are to be determined by representative measurements, approx. 3 links per length of 27.5 m, made at the ends of the links where the wear is greatest.

2.3.7 For additional details on thickness measurements for special ship types, see [Section 4](#)

### 2.4 Corrosion and wear tolerances

2.4.1 Where thickness measurements according to 2.3 result in corrosion and wear values exceeding those stated in the following, the respective hull structural elements will have to be renewed.

GL reserve the right where applicable to modify the indicated values according to 2.4.3 and 2.4.5.3 referring to the maximum permissible large-surface corrosion allowances.

Where reduced material thickness was admitted for the new building (effective system of corrosion protection), the permissible corrosion allowances are to be based on the unreduced rule thickness.

### 2.4.2 Longitudinal strength

Maximum permissible reduction of midship section modulus: 10%.

### 2.4.3 Local strength

Maximum permissible large-surface reduction of plate thickness and web thickness of profiles:  $t_k$

for  $t \leq 11,5 \text{ mm}$ :  $t_k = 1,5 \text{ mm}$

for  $t > 11,5 \text{ mm}$ :  $t_k = 0,09 t + 0,45 \text{ mm}$ ,  
max. 3,0 mm

$t$  = plate and/or web thickness in [mm], as stipulated in the GL Construction Rules.

**Table 3.2 Class Renewal Surveys (Hull)**  
**- Minimum Requirements for Thickness Measurements**

Class renewal survey [No.] and ship's age [years]			
I. age $\leq 5$	II. $5 < \text{age} \leq 10$	III. $10 < \text{age} \leq 15$	IV. and subsequent, age $> 15$
Suspect Areas throughout the vessel			
	One transverse section abreast a cargo space within the amidships 0,5 L.	Two transverse sections in way of cargo spaces within the amidships 0,5 L.	Three transverse sections in way of cargo spaces within the amidships 0,5 L.
		All cargo hold hatchcovers and coamings (plating and stiffeners).	
		All exposed main deck plating within 0,5 L amidships.	All exposed main deck plating full length.
		All wind- and water strakes within 0,5 L amidships.	All wind- and water strakes full length.
		Internals in forepeak tank.	Internals in forepeak and after peak tanks.
		Lowest strake and strakes in way of tween decks of selected transverse bulkheads in cargo spaces together with internals in way.	Lowest strake and strakes in way of tween decks of all transverse bulkheads in cargo spaces together with internals in way.
			Representative exposed superstructure deck plating (poop, bridge, and forecastle deck).
			All keel plates full length. Also, additional bottom plates in way of cofferdams, machinery space and aft ends of tanks.
			Plating of seachests. Shell plating in way of overboard dis-charges as considered necessary by the Surveyor.

Maximum permissible locally limited reduction of thickness: 0,2 t.

In ballast tanks in way of 1,5 m below the weather deck, if the weather deck is the tank deck:  $t_k = 2,5 \text{ mm}$

In cargo oil tanks in way of 1,5 m below the weather deck, if the weather deck is the tank deck, and for horizontal structural elements in cargo oil and fuel tanks:  $t_k = 2,0 \text{ mm}$ .

In dry cells, such as fore-to-aft passageways of container ships and comparable spaces, and for hatch covers of dry cargo hold:

for  $t \leq 11,5 \text{ mm}$ :  $t_k = 1,0 \text{ mm}$

for  $t > 11,5 \text{ mm}$ :  $t_k = 0,09 \cdot t$ , max. 2,5 mm

Maximum permissible surface reduction of the side shell in way of the ice belt: 2,0 mm.

#### 2.4.4 Anchor equipment

Maximum permissible reduction of the mean diameter of chain links: 12 %.

Maximum permissible reduction in weight of anchors: 10 %.

#### 2.4.5 High speed craft

**2.4.5.1** For high speed (seagoing) craft as defined in Part 3 – Special Craft, Chapter 1 – High Speed Craft the following corrosion and wear tolerances apply, see also [Section 2 C, 3.1.3.10](#).

##### 2.4.5.2 Longitudinal strength

Maximum permissible reduction of midship section modulus: 10 %.

##### 2.4.5.3 Local strength

Where applicable, the maximum permissible large-surface reduction  $t_k$  of plate thickness and web thickness of profiles is:

for  $t \leq 10,5 \text{ mm}$ :  $t_k = 0,5 \text{ mm}$

for  $t > 10,5 \text{ mm}$ :  $t_k = 0,03 t + 0,2 \text{ mm}$ ,

max. 1,0 mm

Tank bottoms:  $t_k = 1,0 \text{ mm}$

Maximum permissible locally limited reduction of thickness: 0,1 t.

If the measures for corrosion protection described in the Rules Part 3 – Special Craft, Chapter 1 – High Speed Craft, Section 3, [C3.1.5](#) are fully applied, the corrosion reduction  $t_k$  can be assumed as 0,0 mm for steel and the aluminium alloys defined in Section 3, [C3.2.3](#). In no case the under-thickness tolerances as defined in [C3.2.2.2](#) and [C3.2.3.3](#) shall be exceeded.

**2.4.5.4** For anchor chain cables the maximum permissible reduction of the mean diameter of chain links is 10 %.

### 3. Additional requirements for General Dry Cargo ships

**3.1** The following additional requirements refer to the hull structure and piping systems of all self-propelled general dry cargo ships carrying solid cargoes other than:

- bulk carriers subject to ESP surveys<sup>8</sup>
- dedicated container carriers
- dedicated forest product carriers (no timber or log carriers)
- ro-ro cargo ships
- refrigerated cargo ship
- dedicated wood chip carriers
- dedicated cement carriers
- livestock carriers
- dock/deck ships

**3.2** The additional survey requirements<sup>9</sup> apply to surveys of hull structure and piping systems in way of cargo holds, cofferdams, pipe tunnels and void spaces within the cargo area and all ballast tanks. The requirements are additional to the classification requirements applicable to the remainder of the ship.

**3.3** The requirements contain the minimum extent of examination, thickness measurements and tank testing. The survey is to be extended when substantial corrosion and/or structural defects are found and will include additional close-up survey where deemed necessary by the Surveyor. The extent of the survey may be reduced provided there is no structural diminution and the coating is found in good condition<sup>10</sup>.

**3.4** Unless otherwise regulated in the following requirements of 3. the applicable provisions of this Section shall be observed.

### 3.5 Annual surveys

**3.5.1** The survey is to ensure that the hull, hatch covers, coamings and piping are maintained in satisfactory condition, as stipulated in [1.1](#)

<sup>8</sup> Requirements see UR Z 10.2 of IACS

<sup>9</sup> For the additional survey requirements see UR Z 7.1 of IACS

<sup>10</sup> Good condition: Condition with only minor spot rusting

**3.5.2** In addition, suspect areas<sup>11</sup> identified at previous Class Renewal or Intermediate Surveys shall be overall and close-up surveyed. Thickness measurements shall be taken of the areas of substantial corrosion and the number of thickness measurements shall be increased to determine the extent of substantial corrosion.

**3.5.3** For General Dry Cargo Ships over 10 years of age, an overall survey of a representative forward and aft cargo hold and their associated tween deck spaces shall be carried out. Where this level of survey reveals substantial corrosion or the need for remedial measures, the survey shall be extended as deemed necessary by the Surveyor.

**3.5.4** For General Dry Cargo ships over 15 years of age, an overall survey of all cargo holds and tween deck spaces and a close up examination of minimum 25 % of frames to establish the condition of the lower one-third of the shell frames, adjacent shell plating and lower frame connections in a forward lower and one other selected lower cargo hold shall be carried out. Where this level of survey reveals substantial corrosion or the need for remedial measures, the survey shall be extended, as deemed necessary by the Surveyor. Where the protective coating in cargo holds is found to be in good condition<sup>7</sup>, the extent of the close-up surveys may be specially considered. All piping and penetrations in cargo holds, included over-board piping, shall be examined.

### **3.6 Intermediate Surveys**

**3.6.1** In addition to the surveys and checks listed in 3.5 and as stipulated in 1.2, the following requirements are to be observed. For bottom surveys see also B.1.6

**3.6.2** An overall survey of one representative forward and one representative aft cargo hold and their associated tween deck spaces for ships aged 5 to 10 years shall be carried out. For ships aged 10 to 15 years, an overall survey of all cargo holds and tween deck spaces shall be performed. For seawater ballast tanks see also 1.2.2

**3.6.3** In case of ships exceeding 15 years of age the intermediate survey shall be to the same extent as the previous Class Renewal Survey according to 1.3 and 3.7. However, testing of ballast tanks and cargo holds used for ballast water as well as the maximum permissible reduction of the mean diameter of chain links and weight of anchors is not required unless deemed necessary by the Surveyor.

### **3.7 Class Renewal Surveys**

**3.7.1** In addition to the surveys and checks listed in 3.6 above and as stipulated in 1.3, the following requirements are to be observed. For dry-docking see also 1.3.1.3

**3.7.2** An overall survey of all tanks and spaces, excluding fuel oil, lube oil and fresh water tanks, shall be carried out at each Class Renewal Survey, see also Table 3.1. Each Class Renewal Survey shall include a close-up examination of sufficient extent to establish the condition of the shell frames and their end attachments in all cargo holds and salt water ballast tanks as indicated in Table 3.3. For seawater ballast tanks see also 1.3.2

**3.7.3** The minimum requirements for additional thickness measurements at the Class Renewal Survey as per Table 3.2 are given in Table 3.4. Thickness measurements to determine both general and local level of corrosion in the shell frames and their end attachments in all cargo holds and salt water ballast tanks, as well as on the transverse bulkhead plating shall be carried out. The thickness measurement may be dispensed with provided the Surveyor is satisfied by the close-up examination, that there is no structural diminution, and the protective coating where applied remains efficient and in good condition<sup>7</sup>. The Surveyor may extend the thickness measurements as deemed necessary.

When thickness measurements indicate substantial corrosion, the number of thickness measurements shall be increased to determine the extent of substantial corrosion. Transverse sections shall be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

**3.7.4** All boundaries of salt water ballast tanks and deep water tanks used for salt water ballast within the cargo area length shall be pressure tested. For fuel oil tanks, only the representative tanks shall be tested. The Surveyor may extend the tank testing as deemed necessary. Tanks are to be tested with a head of liquid to the top of the air pipes for ballast tanks, deep tanks or fuel oil tanks. For tightness and pressure tests see also 1.3.2.1.4

## **4. Damage and repair surveys**

**4.1** Where damage has occurred to the ship's hull, machinery, including the electrical plant, the automatic/remote-control systems, etc., the damaged parts are to be made accessible for inspection in such a way that the kind and extent of the damage can be thoroughly examined and ascertained, see also Section 2, B.2.3.

In the case of grounding, dry-docking or, alternatively, an in-water survey is required.

<sup>11</sup> Suspect Areas: Locations showing substantial corrosion and/or considered by the Surveyor to be prone to rapid wastage.



**4.2** The repair measures are to be agreed with the Surveyor such as to render possible confirmation of the class without reservation upon completion of the repairs. In general, a confirmation of class with recommendations, e. g. in the case of a preliminary repair ("emergency repair"), requires to be approved by GL Head Office.

**4.3** Surveys conducted in the course of repairs are to be based on the latest technical knowledge and instructions by GL. In exceptional cases advice is to be obtained from GL Head Office, in particular where doubts exist as to the cause of damage.

**4.4** For older ships, in the case of repairs and/or replacement of parts subject to classification, as a matter of principle, the Construction Rules in force

during their period of construction continue to be applicable.

This does not apply in the case of modifications required to the structure in the light of new knowledge gained from damage analyses, with a view to avoiding recurrence of similar damages.

**4.5** Regarding the materials employed and certificates required, the requirements for new buildings are applicable, see [Section 2, B.3](#).

**4.6** Regarding damages or excessive wastage beyond allowable limits that affect the vessel's class, see [Section 2, B.2.4](#).

**Table 3.3 Class Renewal Surveys of General Dry Cargo Ships (Hull)**  
**Minimum Additional Requirements for Close-up Surveys**

Class Renewal survey [No.] and ship's age [years]			
I. age ≤ 5	II. 5 < age ≤ 10	III. 10 < age ≤ 15	IV. and subsequent, age >15
Selected shell transverse frames in one forward and one aft cargo hold and associated tween deck spaces	Selected shell transverse frames in all cargo holds and associated tween deck spaces	All shell frames in the forward lower cargo hold and 25 % of frames in each of the remain-ing cargo holds, and tween deck spaces including upper and lower end attachments and adjacent shell plating	All shell frames in all cargo holds and tween deck spaces including upper and lower end attachments and adjacent shell plating
One selected cargo hold transverse bulkhead including bulkhead plating, stiffeners and girders	One traverse bulkhead in each cargo hold including bulkhead plating, stiffeners and girders	All cargo hold transverse bulkheads including bulk-head plating, stiffeners and girders	Other items: As for class renewal survey No. III
	Forward and aft transverse bulkhead in one side ballast tank including stiffening system	All transverse bulkheads in ballast tanks including stiffening system	
All cargo hold hatch covers and coamings ( plating and stiffeners )			
	One transverse web frame or watertight transverse bulkhead with associated plating and framing in two representative water ballast tanks of each type (i.e. topside, hopper side or double bottom tank)	All transverse web frames or watertight transverse bulkheads with associated plating and framing in each water ballast tank (i.e. topside, hopper side or double bottom tank)	
	Selected areas of all deck plating and under deck structure inside line of hatch openings between all cargo hold hatches  Selected areas of inner bottom plating	All deck plating inside line of hatch openings between cargo hold hatches  All areas of inner bottom plating	
<i>Note: Close-up survey of cargo hold transverse bulkheads to be carried out at the following levels:</i> – immediately above the inner bottom and immediately above the tween decks, as applicable – mid-height of the bulkheads for holds without tween decks – immediately below the main deck plating and tween deck plating			

**Table 3.4 Class Renewal Surveys of General Dry Cargo Ships (Hull)**  
**Minimum Additional Requirements for Thickness Measurements**

Class Renewal survey [No.] and ship's age [years]			
I. age ≤ 5	II. 5 < age ≤ 10	III. 10 < age ≤ 15	IV. and subsequent, age >15
	Measurement for general assessment and recording of corrosion pattern of those structural members subject to close up survey according to Table 3.3		
		All exposed main deck plating within the cargo length area	All exposed main deck plating full length
		All wind and water strakes within the cargo length area  Selected wind and water strakes outside the cargo length area	All wind and water strakes full length port and starboard
			Each bottom plate including lower turn of the bilge  Duct keel or pipe tunnel plating and internals

## D. Refrigerating Installations

### 1. General, definitions

#### 1.1 Kinds of surveys

**1.1.1** In order to maintain their class, refrigerating installations with GL class have to be subjected to the following surveys:

- annual survey see [2.1](#)
- intermediate survey, nominally, at mid-time between class renewal surveys see [2.2](#)
- class renewal survey every five years, see [2.3](#)
- continuous class renewal survey where, on ship owner's request and with the Society's consent, the surveys required shall be spread over the period of class, see [2.4](#)
- damage survey where the refrigerating installation is defective or where the ship's hull or parts of the machinery have been damaged such that the operability of the refrigerating installation might be affected, see [3.1](#)
- conversion surveys, see [3.3](#).

**1.1.2** GL reserve the right to carry out extraordinary surveys or to demand trials between the due dates of regular surveys, if considered necessary. Such surveys may be credited to the regular surveys referred to above.

**1.1.3** For ascertaining the operability of the installation concerned for a defined purpose, in addition to the surveys for maintenance of the class, on application, the following - likewise extraordinary - surveys and tests will be conducted:

- surveys in the port of loading, see [3.4.1](#)
- safety surveys, see [3.4.2](#)
- specially agreed surveys (e. g., for confirmation of class in the case of sale of the ship), see [3.4.3](#)
- refrigerating tests, see [3.2](#).

#### 1.2 Survey instructions

**1.2.1** The Society's local representative is to be informed in due time about prescribed surveys or intended repairs or alterations, so that all work may be suitably supervised.

**1.2.2** The results of each survey - with the exception of loading port surveys - as well as any special recommendations, on which maintenance of class has been made conditional, will be entered in the refrigerating installation certificate. The character of classification, month and year of the commencement of the class period, as well as month and year of the last annual survey (and/or last intermediate survey, or last class renewal survey), will be stated in the Register Book.

**1.2.3** Any deficiencies and/or damages ascertained (also during surveys as per [1.1.3](#) ) may entail restrictions of class and/or are to be followed up within the scope of classification.

**1.2.4** The reports prepared by the Surveyors will be checked by GL Head Office. The results of surveys carried out will be published in Part 2 of the Register Book, upon acceptance.

**1.2.5** Where defects are repaired provisionally only, or where the Surveyor does not consider immediate repairs or replacements to be necessary, the class of the refrigerating installation may be confirmed for a limited period or for one voyage by making a corresponding entry in the certificate of classification. Upon withdrawal of such restrictions, a relevant note is to also be entered in the certificate of classification.

**1.2.6** If a refrigerating installation has to be surveyed in a port where, or near which, there is no Surveyor to GL, the procedure outlined in [A.1.9](#) will be applicable.

## **2. Regular surveys, procedures**

### **2.1 Annual surveys**

**2.1.1** The refrigerating machinery is to be checked in operation. During this check, the delivery and discharge temperatures at the air coolers and at the brine coolers respectively, the temperatures of the refrigerated cargo spaces, or refrigerated cargo containers, of the ambient air, the cooling water inlet and outlet, the refrigerant in the condenser and evaporator will be determined.

**2.1.2** The entire plant for the power supply, including the part of the electrical plant necessary for operation of the refrigerating installation, is to be inspected externally. The Surveyor is to obtain the information required on the condition of the installation from the operating data records for the refrigerating and machinery installation and is then to decide whether individual machines will have to be opened up for inspection, see also [2.3.4](#).

**2.1.3** Insulation resistance measurements are to be carried out at the electrical plant. Any measurement protocols prepared on board may be considered.

**2.1.4** All pressure vessels, including valves, fittings and safety devices, are to be inspected externally.

If ammonia is used as refrigerant, the covers of one or more heat exchangers are to be taken off for inspection of the tube plates. Depending on the inspection result, the Surveyor may require further parts of the installation to be opened up for inspection.

**2.1.5** The refrigerant and brine pipes and their insulation are to be examined externally, and the pipes are to be tested for tightness during operation.

**2.1.6** In the refrigerated cargo spaces, the air coolers, the brine grids and direct expansion evaporators respectively, as well as circulating fans, are to be inspected during operation.

**2.1.7** The defrosting devices are to be externally inspected. Where necessary, proof is to be furnished of their proper functioning.

**2.1.8** Bilge coverings are to be opened up. Bilges are to be checked as to their perfect condition. The drains of the upper spaces with their closing devices, the bilge pipes and their suction strums, as well as the sounding pipes, are to be inspected. Hatches, doors, pipelines, thermometer tubes with their connections and fastenings, as well as watertight doors and air ducts, are to be checked. Cemented parts where brine might seep into the bilges are to be inspected with particular care.

**2.1.9** The insulation of all refrigerated cargo spaces, apparatus and piping are to be checked as to whether they are free from damages and dry, especially at positions where moisture may collect, e. g. in the bottom insulation underneath the hatches, underneath stringers and below decks.

After repairs of the hold insulation, the Surveyor has to satisfy himself that no cooling air enters the insulation.

**2.1.10** The proper operation of dehydrators, thermometers and remote indicating thermometers is to be checked.

The proper operation of air duct couplings for connecting refrigerated containers to the ship's own refrigerated installation has to be checked. Also, it is to be ascertained whether the air ducts are free from defects.

The results of checks conducted on board may be considered.

### **2.2 Intermediate surveys**

**2.2.1** As against the procedure outlined in [2.1](#), starting with the 2nd class period, the second or third annual survey within a class period will as an intermediate survey to be extended in scope as follows.

**2.2.2** Parts of compressors subject to wear, such as cylinders, pistons, piston rods, glands, bearings as well as parts of auxiliaries, such as shafts, impellers and diffusers of centrifugal pumps, etc., are to be inspected at random, unless the Surveyor considers a thorough examination to be necessary. The driving motors of compressors are to be inspected. Also,

parts necessary for operation of the driving motors are included, see also [2.3.4](#).

**2.2.3** At the Surveyor's discretion, the end covers of some heat exchangers are to be removed for inspection of the tube plates and tubes.

### **2.3 Class Renewal Surveys**

**2.3.1** The class period of the refrigerating installation should coincide with that of the hull and the machinery. Apart from the surveys as detailed in [2.1](#) and [2.2](#), the following tests and inspections are to be carried out:

- examination of all parts of compressors and driving motors subject to wear, at the Surveyor's discretion, see [2.3.4](#)
- inspection of the primary installation for power supply of the refrigerating installation, as well as of the electrical installation
- inspection of the sea inlet and discharge valves for cooling water supply to the installation (possibly, within the scope of classification of the ship)
- internal inspection of the pressure vessels, as far as possible. The end covers of all heat exchangers are to be removed, see [2.2.3](#)
- tightness tests on condensers, evaporators, refrigerant and brine pipes. Pipe coils (air coolers) in the primary/secondary refrigerating system are to be inspected, removed at the Surveyor's discretion and/or subjected to a hydraulic pressure test.

**2.3.2** In the case of new installations the above-mentioned tightness tests, as well as the removal of parts of the piping insulation and dismantling of pipe coils, may be dispensed with at the time of the first class renewal survey, at the Surveyor's discretion.

**2.3.3** Hydraulic pressure tests on pressure vessels are to be carried out for the first time 10 years after initial operation, and subsequently, on the occasion of each class renewal. In the case of pressure vessels operated with refrigerants in closed circuit, the periodical hydraulic pressure tests may be dispensed with. For surveys after repairs, see [3.1](#).

**2.3.4** Where screw compressors or semi-hermetic piston compressors are fitted, for which manufacturers have prescribed fixed intervals for maintenance or replacements, GL may on application agree to differing intervals between surveys, provided that the compressors are equipped with reliable working-hour meters and that a sufficient number of units ready for installation or of complete rotor runner sets is available on board.

A supplementary sheet or the Appendix to the Re-refrigerating Installation Certificate contains more detailed information as to whether such surveys will be accepted.

### **2.3.5 Spare parts**

Spare parts are to be checked for completeness as per the Rule requirements and/or according to the lists approved by GL and kept in the ship's files, as well as for their operability.

### **2.4 Continuous class renewal surveys**

**2.4.1** If application of the continuous class renewal system has been agreed upon, it is to be ensured that the intervals between successive inspections of the same parts of the refrigerating installation do not exceed the periods normally allowed for maintenance of the class. In particular, the surveys according to [2.1](#) are to be conducted annually.

**2.4.2** Prior to expiry of the period of classification, a final survey of the installation is to be conducted, even if all parts have already been surveyed during this period. If deemed necessary by the Surveyor, individual parts may be re-inspected.

**2.4.3** Refrigerating machinery installations which are subject to a Condition Monitoring System, see [B 1.3.9](#).

## **3. Extraordinary surveys and inspections**

### **3.1 Damage surveys**

**3.1.1** In case of damage the refrigerating installation is to be made accessible for inspection in such a way as to enable the damage to be thoroughly examined for assessment of its kind and extent.

**3.1.2** Following repair, the installation is to be subjected to a trial in the presence of the Surveyor, who will enter a relevant note in the Class Certificate.

### **3.2 Refrigeration tests for ships in service**

If there are any doubts in respect of the capacity of the installation or the quality of the insulation, the Society reserves the right to require an additional test in the form of a refrigeration test. Also, a refrigeration test may be carried out on application.

### **3.3 Conversion surveys**

In the case of conversion of the refrigerating installation or of equipment essential for operation of the refrigerating installation, like for new buildings, surveys are to be performed in accordance with approved particulars.

### 3.4 Other extraordinary surveys

#### 3.4.1 Loading port survey

**3.4.1.1** Where the owner or any other interested party applies for a loading port survey to be carried out prior to taking over refrigerated cargo, this will be performed as stated below. The certificate on such survey documents the present condition of the installation. No relevant entry will be made in the Register Book.

**3.4.1.2** Where no Surveyor to Germanischer Lloyd is available at the loading port, the loading port survey may be conducted at one of the preceding ports of call. If no Surveyor to Germanischer Lloyd is available there either, the survey report submitted by an expert or, failing that, a survey report signed by two of the ship's engineers may be accepted.

**3.4.1.3** The loading port survey is to be carried out as follows:

- The refrigerated spaces, scuppers and bilges in the refrigerated cargo spaces are to be clean and dry, the cargo space ceilings and battens have to be in order, and the insulation and other fixtures are to be free from defects
- The bilge pipes, sounding and drain pipes of the refrigerated cargo spaces are to be in good condition and effective
- The Surveyor has to check whether the entire refrigerating installation operates without objections, and to record the temperatures in the cargo spaces or refrigerated cargo containers
- The refrigerated cargo spaces and air ducts are to be free of odour, so that no unfavourable effects upon the cargo to be loaded are to be expected
- The proper operation of air duct couplings for connecting refrigerated containers to the ship's own refrigerating installation is to be checked,

as is the intactness of the air ducts. If refrigerated cargo containers are coupled to the air ducts during the onboard survey, the tight sealing effect of the couplings is also to be checked.

#### 3.4.2 Technical safety surveys

**3.4.2.1** On application, GL will perform technical safety surveys in accordance with approved particulars and, if appropriate, pressure tests on essential components (e. g. apparatus and vessels under refrigerant pressure) of refrigerating installations for provisions, air conditioning etc.

**3.4.2.2** On application, GL will also carry out the required periodical surveys of the pressure vessels and apparatus exposed to refrigerant pressure, mentioned above.

#### 3.4.3 Specially agreed surveys

**3.4.3.1** Where surveys are required on account of (national) official ordinances, international conventions or other provisions, GL will perform these on application by or on behalf of operators, in accordance with the relevant regulations.

**3.4.3.2** Also, upon special agreement, GL will carry out condition surveys on the occasion of change of ownership.

**3.5** All activities as outlined in 3.1 to 3.4 are likewise subject to the general conditions of Section 1.

### E. Diving systems

See Part 5 –Offshore Technology, 1 – Underwater Technology, Chapter 1 – Diving Systems and Diving Simulators