

Section 4

SURVEYS – SPECIAL SHIP TYPES

1. OIL TANKERS

1.1 General Requirements

1.1.1 Application

1.1.1.1 The following instructions refer to oil tankers and product carriers as defined by the BRS Construction Rules, Chapter 1, Section 24, i.e., also to ships intended for the alternative carriage of dry cargo or oil.

1.1.1.2 For the hull structure and piping systems in way of cargo tanks, pump rooms, cofferdams, pipe tunnels, void spaces within the cargo area, and for all ballast tanks of ships with the class notation "**ESP**", additional surveys are required, as defined in the following.

1.1.1.3 Unless otherwise stated in the following, the arrangements per Section 3 apply.

1.1.2 Extent of surveys

1.1.2.1 The surveys are to cover all installations, outfit and equipment related to the carriage and handling of oil cargo. They also cover the surveys required by the SOLAS regulations¹ for oil tankers. The protective equipment and the safety equipment required by the SOLAS regulations for protection of the personnel as well as other equipment and outfit, which are no class requirement items, are not covered by the present Rules for Classification and Surveys. These items will, however, be included in the surveys, if compliance with the requirements of an Administration has to be certified.

1.1.2.2 Hull

The following requirements under 1.2 to 1.4 define the minimum extent of examinations. The surveys are to be extended where substantial corrosion and/or structural defects are found, and will include an additional close-up survey (close visual inspection range, preferably within reach of hand) where deemed necessary by the Surveyor.

1.1.2.3 Repairs

Necessary repairs, see Section 2, 2.2.4.

1.1.3 Documents to be carried on board

The owner is to supply and maintain on board documentation as specified under 1.1.3.1 and 1.1.3.2 which should be readily available for the surveyor. The documentation is to be kept on board for the life time of the ship.

1.1.3.1 Survey Report File:

¹ "International Convention for the Safety of Life at Sea" (1974) and Amendments

A Survey Report File is to be part of the documentation on board consisting of:

- Reports on structural surveys
- Executive Hull Summary ²
- Thickness measurements reports ²

The Survey Report File is to be available also in the Owners management office.

1.1.3.2 Supporting Documents:

- Main structural plan of cargo and ballast tanks
- Previous repair history
- Cargo and ballast history ²
- Extent of use of inert gas plant and tank ² cleaning procedures
- Inspections by ship's personnel with reference to ²
 - structural deterioration in general
 - leakage in bulkheads and piping
 - condition of coating or corrosion protection
- Survey Programme as required under 1.6 ² till the completion of next Class Renewal Survey
- Any other information that will help to identify Suspect Areas requiring inspection.

1.1.4 Access to Structures

1.1.4.1 Regarding accessibility to spaces, absence of gases, removal of residual cargo and rust, and in respect of lighting, the ship is to be prepared such as to enable it to be duly examined without any risk.

Where "soft coating"³ has been applied, it may be necessary to remove this coating, at least partially.

1.1.4.2 For close-up surveys in cargo and salt water ballast tanks, one or more of the following means for access, acceptable to the Surveyor, is to be provided:

- permanent or temporary staging
- passages through structures

² Applicable in conjunction with Class Notation "ESP", see Section 2, 3.3.1.6

³ "Soft coating" means: Solvent-free coating on base of wool grease, grease, mineral oil and/or wax that remains soft so that it wears off when touched.

- lifts and moveable platforms
- boats or rafts
- other equivalent means.

1.1.5 Survey at Sea

Upon prior agreement with the owner, BRS may carry out surveys at sea or at anchorage, provided the Surveyor is given the necessary assistance, including safety equipment, by the personnel on board. See also Section 3, 1.1.4.

1.1.6 Survey Programme²

For class renewal a special survey programme (planning document) has to be prepared. In the case of oil tankers exceeding 20.000 tdw this survey plan is to be prepared by the owner on the basis of the documentation elaborated on the occasion of the intermediate survey. The program is to be agreed with BRS Head Office in due time prior to commencement of the class renewal survey.

For oil tankers up to 20.000 tdw the survey program is to be prepared when starting the class renewal survey.

For oil tankers more than 10 years of age ESP from last RS/2SS) to be apply for Intermediate Survey.

1.2 Annual Surveys

1.2.1 General, scope

1.2.1.1 In addition to the surveys as stipulated in Section 3, 3. 1.1 the following installations, structural elements, items of equipment and outfit, including facilities for handling and carriage of the oil cargo as stated below in 1.2.2 to 1.2.8, are to be surveyed in order to ensure that they are maintained in satisfactory condition.

Prior to inspection, the Surveyor shall examine the documentation required to be kept on board for this type of vessel, as a basis for the survey (see 1.1.3).

1.2.1.2 The annual survey is to ensure that the cargo handling installations and pertinent safety equipment are in good working order. The surveys are preferably to be carried out during loading or discharging operations.

For the aforementioned surveys normally access to cargo holds or other spaces within the cargo area necessitating gas-freeing is not required, unless checking of the equipment for correct functioning is not possible otherwise.

1.2.2 Installations on the weather deck

1.2.2.1 On the weather deck the following equipment, if fitted, will have to be surveyed and/or checked:

- cargo tank hatches, including sealings and covers
- cargo tank pressure/vacuum relief valves and flame arresters
- air pipe heads/flame arresters of bunker and oily ballast/slop tanks and the like
- cargo, crude oil washing, bunkering, ballast and cargo tank vent line

- cargo tank gauging systems
- for electrical equipment, see 1.2.4
- for fire-extinguishing equipment, see 1.2.5
- emergency towing appliances for oil tankers exceeding to 20.000 tdw
- safe access to tanker bow

1.2.2.2 The cargo handling installations (including spool pieces of the loading and unloading systems, spray shields and drip trays, cargo hoses, etc.) arranged on the weather deck, possibly in the fore or aft area, are to be visually examined.

1.2.3 Pump rooms and pipe tunnels

Equipment in pump rooms and other enclosed spaces serving cargo handling operations, including pipe tunnels if fitted, is to be checked, in particular as to leakages and potential sources of danger (explosion protection), e.g.:

- condition of bulkheads and bulkhead penetrations (cracks, leakages)
- all piping systems including pressure gauges
- cargo bilge, ballast and stripping pumps for leakages, as far as practicable
- electrical and mechanical remote control and emergency stopping equipment (see also 1.2.4)
- ventilation systems.

1.2.4 Electrical installations

In gas-dangerous spaces and zones the electrical equipment, including cables and their supports is to be visually examined, particularly regarding explosion protection.

1.2.5 Fire-extinguishing systems

The survey of the fire-extinguishing systems covers

- external inspection of all systems for the cargo tank area, including the pump room
- checking of the foam fire extinguishing and/ or water spraying system on deck.
(See section 3, 3.1.1.4.)

1.2.6 Inert gas systems

A survey of the inert gas system covers:

- external checking of important system components for wear and corrosion
- external checking of piping, fittings and safety equipment, including operational test of the blowers

- checking of the soot blowers as to interlocking
- checking of the alarm, recording and safety equipment.

BRS-Form F 111 is to be used for the survey.

1.2.7 Ballast tanks

Sea water ballast tanks shall be surveyed, within annual surveys, as a consequence of findings on the occasion of an intermediate or class renewal survey; see 1.3.3.3 and Section 3, 3.1.2.2.

Regarding the renewal of the coating see Section 3, 3.1.2.2.3.

In case of oil tankers exceeding 15 years of age all ballast tanks adjacent to a cargo or fuel oil tank with heating coils are to be examined internally.

If considered necessary by the surveyor, thickness measurements are to be carried out, which may have to be extended if substantial corrosion is found.

1.2.8 Miscellaneous

On the occasion of the annual survey also the following items are to be checked:

- special arrangements related to damage control, e.g. sliding bulkhead doors in accordance with the approved damage control plan (Also for tankers of less than 100 m in length)
- cargo sample stowage spaces
- gas detection instruments
- cargo information, safety instructions. (See 1.1.3.2).

1.3 Intermediate Surveys

1.3.1 General

1.3.1.1 In addition to the surveys and checks listed in item 1.2 above, on the occasion of the second or the third annual survey the checks mentioned below will be carried out. If deemed necessary by the Surveyor, functional test, pressure test or thickness measurements are to be carried out in addition to the survey.

1.3.1.2 For oil tankers exceeding 10 years of age the intermediate survey is to be carried out in drydock. For oil tankers of 15 years of age or less, BRS may agree to a bottom in-water survey according to Section 3, 3.1.7.

1.3.1.3 In case of ships exceeding 15 years of age the intermediate survey is to be enhanced to the scope of the previous class renewal survey according to 1.1.6 and 1.4. Pressure testing of ballast and cargo tanks is not required unless deemed necessary by the attending Surveyor. For double hull oil tankers see Table 4.0.

1.3.2 Installations in the cargo area

1.3.2.1 Irrespective of the vessel's age the condition of the loading/unloading, tank cleaning, bunkering, ballast, steam and venting systems, as well as of the ventilation and ventilator heads is to be checked. In cases of doubt pressure tests and/or wall thickness measurements may be

demanded.

Table 4.0 Intermediate Surveys (Hull) of Double Hull Oil Tankers. Minimum Requirements for Overall and Close-up survey and Thickness Measurements

Ship's age [years]		
5 < age ≤ 10	10 < age ≤ 15	age > 15
Overall survey of representative water ballast tanks, selected by the attending surveyor (the selection is to include fore and aft peak tanks and three other tanks)	Overall survey of all water ballast tanks, including combined cargo/ballast tanks where fitted	As for the previous Class Renewal Survey
	Overall survey of at least two representative cargo tanks	
	Close-up survey in water ballast tanks of: – all web frames¹ in one complete tank (see Note) – the knuckle area and the upper part (5 metres approximately) of one web frame in each remaining ballast tank³ – one transverse bulkhead² in each complete tank (see Note)	
	Close-up survey in two cargo tanks (or two combined cargo/ballast tanks, where fitted): – the extent of survey should be based on the records of the previous Class Renewal Survey and repair history of the tanks.	
Thickness measurements of those areas found to be suspect areas at the previous Class Renewal Survey	Thickness measurements of those areas found to be suspect areas at the previous Class Renewal Survey	

1, 2 and 3 are areas to be subjected to close-up surveys and thickness measurements.

1 Web frame means vertical web in side tank, hopper web in hopper tank, floor in double bottom tank and deck transverse in double deck tank (where fitted), including adjacent structural members. In fore and aft peak tanks web frame means a complete transverse web frame ring including adjacent structural members.

2 Transverse bulkhead complete in ballast tanks, including girder system and adjacent structural members, such as longitudinal bulkheads, girders in double bottom tanks, inner bottom plating, hopper side, inner hull longitudinal bulkhead, connecting brackets..

3 The knuckle area and the upper part (5 metres approximately), including adjacent structural members. Knuckle area is the area of the web frame around the connections of the slope hopper plating to the inner hull bulkhead and the inner bottom plating, up to 2 metres from the corners both on the bulkhead and the double bottom.

Note
Complete ballast tank: means double bottom tank plus double side tank plus double deck tank as applicable, even if these tanks are separate.

Cargo tank high velocity vent and pressure/vacuum valves are to be function tested, and if deemed necessary by the Surveyor, to be opened up and re-adjusted.

1.3.2.2 Beyond this, the following is to be checked:

- drainage of cargo tank vent lines
- bonding devices of all piping systems and cargo tanks built-in independent from the hull
- cargo hoses (repeat test, if needed).

1.3.3 Ballast and cargo tanks

1.3.3.1 Vessels 5 to 10 years of age:

For spaces used for sea water ballast, an **overall survey** of representative spaces selected by the Surveyor is to be carried out. If such inspections reveal no visible structural defects, the examination may be limited to verifying whether the protective coating continues to be effective.

In sea water ballast tanks, if a protective coating is found in poor condition ⁴ and it is not renewed, if soft coating³ has been applied, if a protective coating was not applied from the time of construction or if corrosion respectively other defects are found, maintenance of the class is to be subject to the tanks in question being examined at annual intervals, and thickness measurements carried out as considered necessary.

Regarding the renewal of coating see also Section 3, 3.1.2.2.3.

1.3.3.2 Vessels more than 10 years of age:

1.3.3.2.1 Following tanks are to be subjected to an **overall survey**:

- at least two representative cargo tanks
- all sea water ballast tanks including combined cargo/ballast tanks. If such inspections reveal no visible structural defects, the examination may be limited to verifying whether the protective coating continues to be effective.

1.3.3.2.2 Close-up surveys are to be carried out to the following extent:

- ballast tanks: Same as for previous class renewal survey
- cargo tanks: Preferably two combined cargo/ ballast tanks. Extent of survey based on record previous class renewal survey and repair history
- additionally, one cargo tank after the third class renewal survey. Extent of survey as above for cargo tanks

The Surveyor may extend the scope of the close-up survey as deemed necessary, see 1.4.2.2.2.

The extent of the survey may be reduced provided there is no structural diminution and the protection coating is found to be in good condition⁵.

1.3.3.3 In the case of seawater ballast tanks the procedure as outlined in 1.3.3.1 (2nd paragraph) shall be followed, if applicable.

Regarding the renewal of coating see also Section 3, 3.1.2.2.3.

⁴ Poor: General breakdown of coating over 20 % or more of areas, or hard scale at 10 % or more of areas under consideration

⁵ Good condition: Condition with only minor spot rusting

1.3.4 Thickness measurements

Thickness measurements are to be carried out in areas found to be suspect during the previous class renewal survey.

Where substantial corrosion is found, the extent of the thickness measurements is to be increased.

Authorization for thickness measurements see Section 3, 3.2.2.

1.3.5 Electrical installations

1.3.5.1 Irrespective of the vessel's age, electrical equipment and cables in gas-dangerous spaces, such as pump rooms and spaces adjacent to cargo tanks, are to be inspected. Insulation measurements are to be carried out (only in gas-free or inerted condition). Any measurement protocols kept on board may be considered.

1.3.5.2 Beyond this, in gas-dangerous areas the following checks are to be made:

- protective earthing of system components (spot checks)
- integrity of certified safe-type equipment
- damages to outer sheet of cables
- function testing of pressurized equipment and of associated alarms.

1.3.6 Inert gas systems

The survey is to be carried out according to BRS program INERT 4.

See Section 3, 2.1.5.7.

1.4 Class Renewal Surveys**1.4.1 General requirements**

1.4.1.1 In addition to the class renewal surveys of the ship's hull, the machinery plant and electrical installation, according to Section 3, 3.1.3, the structural elements, equipment and outfit including the cargo system and pertinent safety devices listed in 1.3.3 for intermediate survey, are to be subjected to thorough examination and testing for proper functioning at the Surveyor's discretion.

It is to be verified that the relevant instructions, documentation and information material, such as cargo handling plans, cargo tank loading limit information etc. are kept on board (see 1.1.3).

1.4.1.2 The class renewal survey of cargo handling installations and related control, alarm and safety devices cannot normally be carried out during loading or discharging operations and is preferably to be carried out with the ship in gas-free condition.

1.4.1.3 Spaces and areas serving cargo handling operations (e.g. cargo control rooms and pump rooms), are to be examined with respect to their general condition and possible sources of danger. All accessible gas tight bulkhead penetrations including gastight shaft sealings are to be visually examined.

1.4.1.4 Regarding planning/survey program, see 1.1.6.

1.4.1.5 For class renewal surveys of oil tankers (hull), the "Continuous Class Renewal" procedure described in Section 3, 2.1.3.6 is excluded.

1.4.1.6 The class renewal survey is to be held when the ship is in drydock or on a slipway, unless a dry-docking survey has been carried out within the admissible period (see Section 3, 2.1.6.7). The ship is to be placed on blocks of sufficient height so that the keel, the bottom plating and the rudder can be examined.

1.4.2 Hull in the cargo area

1.4.2.1 General requirements

1.4.2.1.1 All cargo tanks, sea water ballast tanks including double bottom tanks, pipe tunnels, cofferdams and void spaces bounding cargo holds, decks and outer hull are to be examined. This examination is to be supplemented by thickness measurements and tank testing as deemed necessary to ensure that the structural integrity continues to be given.

The examination is to be sufficiently thorough for revealing substantial corrosion, significant deformations, fractures, damages or other structural deteriorations.

Regarding anticipated thickness measurements, see also holds is to be determined based on the records of ballast Section 3, 3.2.3.5.

1.4.2.1.2 Cargo piping on deck, including Crude Oil Washing piping, and Cargo and Ballast piping within the above spaces are to be examined and tested to working conditions to ensure their continued satisfactory condition.

Special attention is to be given to ballast piping in cargo tanks and cargo piping in ballast tanks and void spaces.

1.4.2.1.3 The survey extent of combined ballast/cargo holds is to be determined based on the records of ballast history, the corrosion protection system provided, and the extent of corrosion found (see 1.1.3.).

1.4.2.2 Surveys

1.4.2.2.1 An overall survey of all tanks and spaces, excluding fuel oil, lubricating oil and fresh water tanks, according to available information is to be carried out.

For fuel oil, lubricating oil and feed water tanks, the necessity for the overall survey is to be determined based on the ship's age, see also Table 3.1.

1.4.2.2.2 Close-up surveys are to be carried out at least according to the requirements shown in Table 4.1, depending on the age of the vessel. For double hull oil tankers see Table 4.2.

The surveyor may extend the close-up survey as deemed necessary taking into account the maintenance of the tanks under survey and the condition of the corrosion protection system, and also in the following cases:

- in particular, tanks having structural arrangements or details which have suffered defects in similar tanks or on similar ships according to available information.
- tanks which have structures approved with reduced scantlings due to an approved corrosion control system.

For areas in tanks where coatings are found to be in a good condition, the extent of close-up surveys according to Table 4.1 may be specially considered by the surveyor.

**Table 4.1 Class renewal Surveys (Hull) of Oil Tankers, Ore/Oil Ships etc.
Minimum 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
One complete transverse web frame ring including adjacent structural members in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast. One deck transverse including adjacent deck structural members in a cargo tank.	All complete transverse web frame rings including adjacent structural members in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast. One deck transverse including adjacent deck structural members in each of the remaining ballast tanks, if any. One deck transverse including adjacent deck structure in a cargo wing tank and in two cargo centre tanks.	All complete transverse web frame rings including adjacent structural members in all ballast tanks and in a cargo wing tank. A minimum of 30 % of all complete transverse web frame rings including adjacent structural members in each remaining cargo wing tank ¹ A minimum of 30 % of deck and bottom transverses adjacent structural members in each cargo centre tank ¹ Additional complete transverse web frame rings as considered necessary by the Surveyor.	As for class renewal survey No. III Additional transverse frames as deemed necessary by the Surveyor.
Lower part of the girder system, including adjacent structural members, of one transverse bulkhead in one ballast tank, one cargo wing tank and one cargo centre tank.	Both transverse bulkheads complete - including girder system and adjacent members - in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast. One transverse bulkhead lower part - including girder system and adjacent structural members - in each of the remaining ballast tanks, one cargo wing tank and two cargo centre tanks.	All transverse bulkheads complete - including girder system and adjacent members - in all cargo and ballast tanks.	Bulkheads: As for class renewal survey No. III.
¹ The 30 % value is to be rounded up to the next whole integer			

1.4.2.2.3 Tank protection

Where provided, the condition of coating or corrosion protection of ballast tanks is to be examined. Detail procedure (possible change to annual intervals) as under 1.3.3.1, regardless of age.

1.4.2.3 Thickness measurements

1.4.2.3.1 The minimum requirements for thickness measurements on the occasion of class renewal surveys are stated in Table 4.3. Extended measurements may be required, e. g. for areas with substantial corrosion and/or as specified in the survey programme (see 1.1.6). Thickness measurements should be witnessed by the Surveyor to the necessary extent.

1.4.2.3.2 For areas in spaces where coatings are found to be in a good condition, the extent of thickness measurements according to Table 4.3 may be specially considered by the surveyor.

**Table 4.2 Class renewal Surveys (Hull) of Double Hull Oil Tankers
Minimum 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
One web frame 1 (means a vertical web in side tank, hopper web in hopper tank, floor in double bottom tank and deck transverse in double deck tank, where fitted, including adjacent structural members). In fore and aft peak tanks means a complete transverse web frame ring including adjacent structural members) in a ballast tank ²	All web frames as defined in I. The knuckle area 4 and the upper part (5 metres approximately) of one web frame in each remaining ballast tank including adjacent structural members.	All web frames 1as defined in I. but in all ballast tanks.	As for Class Renewal Survey No. III. Additional transverse areas as deemed necessary by the Society Surveyor.
One deck transverse 1, (including adjacent deck structural members, or external structure on deck in way of the tank, where applicable) in a cargo oil tank.	One deck transverse 1as defined in I. but in two cargo oil tanks.	All web frames 1(including deck transverses, longitudinal bulk-head vertical girder and cross ties, where fitted, including adjacent structural members), including deck transverse and cross ties, if fitted, in a cargo oil tank. One web frame 1 (including etc., as above) including deck transverses and cross ties, if fitted, in each remaining cargo oil tank.	
One transverse bulkhead 1 (in ballast tanks, including adjacent structural members, such as longitudinal bulk-heads, girders in double bottom tanks, inner bottom plating, hopper side, connecting brackets) in a complete ballast tank. 2 .	One transverse bulkhead 1 as defined in I. but in each ballast tank 2	All transverse bulkheads, in all cargo oil tanks ¹ (complete in cargo tanks, including girder system, adjacent structural members, such as longitudinal bulkheads, and internal structure of lower and upper stools, where fitted) and ballast tanks (complete in ballast tanks including girder system and adjacent structural members, such as longitudinal bulkheads, girders in double bottom tanks, inner bottom plating, hopper side, connecting brackets).	
One transverse bulkhead 1 (lower part in cargo tank, including girder system, adjacent structural members, such as longitudinal bulkheads, and internal structure of lower stool, where fitted) in a cargo oil centre tank and in a cargo oil wing tank 3 .	One transverse bulkhead 1as defined in I. but in two cargo oil centre tanks and in a cargo oil wing tank 3 .		
1 These areas are to be subjected to close-up surveys and thickness measurements. 2 Complete ballast tank means double bottom tank plus double side tank plus double deck tank, even if these tanks are separate. 3 Where no centre cargo tanks are fitted, transverse bulkheads in wing tanks are to be surveyed. 4 Knuckle area is the area of the web frame around the connections of the slope hopper plating to the inner hull bulkhead and the inner			

Table 4.3 Class Renewal Surveys (Hull) of Oil Tankers, Ore/Oil Ships etc. Minimum Requirements for Thickness Measurements

Class renewal survey No.			
I. age ≤ 5 y.	II. 5 < age ≤ 10 y.	III. 10 < age ≤ 15 y.	IV. and subsequent, age > 15 y.
One section of deck plating for the full beam of the ship within the cargo area (in way of a ballast tank, if any, or a cargo tank used primarily for water ballast)	Within the cargo area: a) Each deck plate b) Three transverse sections 1)	Within the cargo area: a) Each deck plate b) Three transverse sections 1)	Within the cargo area: a) Each deck plate b) Three transverse sections 1) c) Each bottom plate
Measurements of structural members subject to close-up survey according to Table 4.1, for general assessment and recording of corrosion pattern			
Suspect areas			
	Selected wind and water strakes outside the cargo area		
		All wind and water strakes within the cargo area	
1) A "transverse section" includes all longitudinal structural members, i.e. plating and longitudinal stiffeners and girders.			

Table 4.4 Class Renewal Surveys (Hull) of Oil Tankers, Ore/Oil Ships, Double Hull Oil Tankers etc. Minimum Requirements for Tank Testing

Class renewal survey No.			
I. age ≤ 5 y.	II. $5 < \text{age} \leq 10$ y.	III. $10 < \text{age} \leq 15$ y.	IV. and subsequent, age > 15 y.
All ballast tank boundaries			
Cargo tank boundaries facing void spaces, pipe tunnels, representative fuel oil tanks, pump rooms or cofferdams			
	All cargo tank bulkheads which form the boundaries of segregated cargoes	All remaining cargo tank bulkheads	

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

In cases where three sections are to be measured, at least one is to include a ballast tank within 0,5 L amidship.

1.4.2.3.4 Regarding thickness measurements, see also Section 3, 3.2. For oil tankers, exceeding 10

years of age and 130 m in length **L**, the longitudinal strength is to be evaluated using the actual thickness measurements. The maximum allowable diminution of midship section modulus should be calculated using specific criteria⁴.

1.4.2.4 Tank testing

1.4.2.4.1 The minimum requirements for tank testing are given in Table 4.4. The surveyor may require tank testing to be extended as deemed necessary.

1.4.2.4.2 Regarding pressure heads and testing with air pressure, see Section 3, 3.1.3.2.1.4.

1.4.3 Cargo area equipment

1.4.3.1 Cargo and ballast piping systems, including valves and fittings, are to be internally inspected for corrosion as deemed necessary by the Surveyor. Subsequently, a pressure test is to be carried out.

1.4.3.2 Cargo, stripping and ballast pumps are to be examined and checked. Pressure relief valves of pumps are to be function tested.

1.4.3.3 Cargo tank high velocity vent and pressure/ vacuum valves are to be overhauled, adjusted by makers/recognized firm and tested under supervision of a Surveyor.

1.4.3.4 Tank venting systems are to be examined; flame arresters are to be opened as far as necessary, and cleaned.

1.4.3.5 Cargo tank heating systems are to be examined and pressure-tested to 1.5 times the operating pressure. (See Section 3, 3.1.5.4.4.)

1.4.3.6 The bilge systems of pump rooms and cofferdams are to be inspected and tested.

1.4.3.7 All ventilation systems in the cargo area including portable fans are to be examined and function-tested.

1.4.3.8 The following equipment is to be function-tested:

- level indicators of cargo tanks
- liquid level alarms – overflow controls
- pressure and temperature alarms
- remote-control systems of cargo pumps
- sampling arrangements of cargo tanks, if fitted
- for inert gas systems see 1.3.5.

1.4.4 Electrical installations

In addition to the inspection and testings as per 1.3.4 the protection devices of electric motors are to be tested.

2. OIL RECOVERYVESSELS

2.1 General Requirements

2.1.1 Application

2.1.1.1 The following instructions refer to oil recovery vessels as defined by the BRS Construction Rules, Chapter 9.

2.1.1.2 Unless otherwise stated in the following, the arrangements as per Sections 3 and 4.1 apply.

2.1.2 Extent of surveys

2.1.2.1 The surveys are to cover installations, outfit and equipment for:

- Operation in oil covered waters
- Recovering oil floating on the water
- The carriage and handling of oil cargo.

They also cover the surveys required by the SOLAS regulations¹ for oil tankers.

The protective equipment and the safety equipment required by the SOLAS regulations for protection of the personnel as well as other equipment and outfit, which are no class requirement items, are not covered by the present Rules for Classification and Surveys. These items will, however, be included in the surveys, if compliance with the requirements of an Administration has to be certified.

2.1.2.2 Hull

The following requirements under 2.2 to 2.4 define the minimum extent of examinations. The surveys are to be extended where substantial corrosion and/or structural defects are found, and will include an additional close-up survey (close visual inspection range, preferably within reach of hand) where deemed necessary by the Surveyor.

2.1.3 Documents to be carried on board

In addition to the documents specified in 1.1.3 the following information is to be readily available for the Surveyor's use in connection with the survey:

- Operations- and equipment manual.
- Maintenance records for the gas detection and alarm system

and any information that will help to identify suspect areas requiring inspection.

2.1.4 Access to structures

2.1.4.1 Regarding accessibility to spaces, absence of gases, removal of residual cargo and rust, and in respect of lighting, the ship is to be prepared such as to enable it to be duly examined without

any risk.

2.1.4.2 For close-up surveys in cargo and salt water ballast tanks, one or more of the following

means for access, acceptable to the Surveyor, is to be provided:

- Permanent or temporary staging
- Passages through structures
- Lifts and moveable platforms
- Boats or rafts
- Other equivalent means

2.1.5 Survey at sea

Upon prior agreement with the owner, BRS may carry out surveys at sea or at anchorage, provided the Surveyor is given the necessary assistance, including safety equipment, by the personnel on board. See also Section 3, 1.1.4.

2.2 Annual Surveys

2.2.1 General, scope

2.2.1.1 In addition to the surveys as stipulated in Section 3, 3. 1.1 the following installations, structural elements, items of equipment and outfit, including facilities for handling and carriage of the oil cargo, are to be surveyed in order to ensure that they are maintained in satisfactory condition.

Prior to inspection, the Surveyor shall examine the documentation required to be kept on board for this type of vessel, as a basis for the survey (see 2.1.3).

2.2.1.2 The annual survey is to ensure that the equipment for operation in oil-covered waters and for oil recovery as well as the cargo handling installations and pertinent safety equipment are in good working order.

For the aforementioned surveys normally access to cargo holds or other spaces within the cargo area necessitating gas-freeing is not required, unless checking of the equipment for correct functioning is not possible otherwise.

2.2.2 Installations on the weather deck

On the weather deck the oil recovery equipment will have to be surveyed and/or checked in addition to the items specified in 1.2.2.

2.2.3 Pump rooms

Equipment in pump rooms and other enclosed spaces used during oil recovery and cargo handling operations is to be checked, in particular as to leakages and potential sources of danger (explosion protection), e.g.:

- Equipment according to 1.2.3
- Equipment for the recovery of oil (separation plants) and the associated pumping

2.2.4 Electrical installations

In gas-dangerous spaces and zones the electrical equipment, including cables and their supports is to be visually examined, particularly regarding explosion protection.

2.2.5 Fire-extinguishing systems

The scope of survey of the fire-extinguishing systems is as specified in 1.2.5.

2.2.6 Equipment for Operation in oil-covered Waters

The following equipment for operation in oil-covered waters is to be visually examined and to be checked:

- Air locks
- Arrangements for effecting the closures necessary for explosion protection
- Ventilation system for pressurizing accommodation and machinery spaces.
- Vapour detection and alarm systems and portable gas detection equipment.

2.2.7 Ballast tanks

In the case of Seawater ballast tanks the procedure as outlined in 1.2.7 shall be followed, if applicable.

2.2.8 Miscellaneous

See 1.2.8

2.3 Intermediate Surveys**2.3.1 General**

In addition to the surveys and checks listed in item 2 above, on the occasion of the second or the third annual survey the checks mentioned below will be carried out. If deemed necessary by the Surveyor, apart from the survey a functional test will be performed.

2.3.2 Installations in the cargo area

2.3.2.1 Irrespective of the vessel's age the condition of the loading/unloading, oil recovery, tank cleaning, bunkering, ballast, steam and venting systems, as well as of the ventilation and ventilator heads is to be checked. In cases of doubt pressure tests and/or wall thickness measurements may be demanded.

Cargo tank high velocity vent valves and pressure/ vacuum valves are to be function tested, and if deemed necessary by the Surveyor, to be opened up and readjusted.

2.3.2.2 In the case of oil recovery vessels, beyond this, the following are to be checked:

- drainage of cargo tank vent lines

- bonding devices of all piping systems and independent cargo tanks
- cargo hoses (repeat test, if needed)
- sea inlet discharge valves
- for appliances with pressurized enclosures, see 2.3.5.

2.3.3 Ballast and cargo tanks

For the scope of the surveys refer to 1.3.3.

2.3.4 Thickness measurements

Thickness measurements are to be carried out in sections found to be suspect on occasion of the previous class renewal survey.

In case of substantial corrosion the extent of the thickness measurements is to be increased.

2.3.5 Electrical installations

For the scope of the surveys refer to 1.3.5.

2.4 Class Renewal Surveys

2.4.1 General requirements

2.4.1.1 In addition to the class renewal surveys of the ship's hull, the machinery plant and electrical installation, the cargo system, the oil recovery system, and the pertinent safety devices listed in 2.3.2 for intermediate survey are to be subjected to thorough examination and testing for proper functioning at the surveyor's discretion.

It is to be verified that the relevant instructions, documentation and information material, such as cargo handling plans, cargo tank loading limit information etc. are kept on board (see 2.1.3).

2.4.1.2 The class renewal survey of cargo handling installations and related control, alarm and safety devices cannot normally be carried out during loading or discharging operations and is preferably to be carried out with the ship in gas-free condition.

2.4.1.3 Spaces and areas used in connection with cargo handling (e.g. cargo control rooms and pump rooms), are to be examined with respect to their general condition and possible sources of danger. All accessible gas tight bulkhead penetrations including gastight shaft sealings are to be visually examined.

2.4.1.4 Drydocking: See Section 3, 3.1.3.1.3 and 1.4.1.6.

2.4.1.5 The equipment for operation of the vessel in oil-covered waters has to be subjected to thorough surveys and operational tests.

2.4.2 Hull

2.4.2.1 General requirements

2.4.2.1.1 All cargo tanks, sea water ballast tanks including double bottom tanks, pipe tunnels, cofferdams and void spaces bounding cargo holds, decks and outer hull are to be examined. This

examination is to be supplemented by thickness measurements and tank testing as deemed necessary to ensure that the structural integrity continues to be given.

The examination is to be sufficiently thorough for revealing substantial corrosion, significant deformations, fractures, damages or other structural deteriorations.

Regarding anticipated thickness measurements, see also Section 3, 3.2.3.5.

2.4.2.1.2 All piping systems within the above spaces are to be examined and tested under working conditions to ensure their continued satisfactory condition.
Special attention is to be given to ballast piping in cargo tanks and cargo piping in ballast tanks and void spaces.

2.4.2.1.3 The survey extent of combined ballast/cargo holds is to be evaluated based on the records of ballast history (see 2.1.3).

2.4.2.2 Surveys

2.4.2.2.1 An **overall survey** of all tanks and spaces is to be carried out.

2.4.2.2.2 The scope of Close-up surveys is to be established based on the requirements shown in Section 4.1, Table 4.1, depending on following items:

- Age of the vessel
- Operation of the vessel during the last period of class

The surveyor may extend the close-up survey as deemed necessary taking into account the maintenance of the tanks under survey and the condition of the corrosion protection system, and also in the following cases:

- In particular, tanks having structural arrangements or details which have suffered defects in similar tanks or on similar ships according to available information.
- Tanks which have structures approved with reduced scantlings due to an approved corrosion control system.

2.4.2.2.3 Corrosion protection

Where provided, the condition of coating or corrosion protection of ballast tanks is to be examined. Detail procedure (possible change to annual intervals) as under Section 3, 3.1.2.2 and 1.3.3.1 (2nd paragraph).

2.4.2.3 Thickness measurements

2.4.2.3.1 The scope of thickness measurements shall be established based on the requirements shown in Section 4.1, Table 4.3, depending on following items:

- Age of the vessel
- Operation of the vessel during the last period of class
- Results of the close-up surveys according to 2.4.2.2.2.

2.4.2.3.2 Transverse sections should be chosen where largest corrosion rates are suspected to occur

or are revealed by deck plating measurements.

In cases where three sections are to be measured, at least one should include a ballast tank within 0,5 L amidship.

2.4.2.3.3 Regarding thickness measurements, see also Section 3, 3.2.

2.4.2.4 Tank testing

2.4.2.4.1 The scope of tank testing shall be established based on the requirements shown in Section 4.1, Table 4.4, depending on following items:

- Age of the vessel
- Operation of the vessel during the last period of class
- Results of the close-up surveys according to 2.4.2.2.2
- Results of the thickness measurements according to 2.4.2.3.

2.4.2.4.2 Regarding pressure heads and testing with air pressure, see Section 3, 3.1.3.2.1.4.

2.4.3 Cargo area equipment

2.4.3.1 Cargo, oil recovery and ballast piping systems, including valves and fittings, are to be internally inspected for corrosion as deemed necessary by the Surveyor. Subsequently, a pressure test is to be carried out.

2.4.3.2 Cargo, stripping, oil recovery, and ballast pumps are to be examined and checked. Pressure relief valves of pumps are to be function tested.

2.4.3.3 Cargo tank high velocity vent and pressure/ vacuum valves are to be overhauled, adjusted by makers/recognized firms and tested under supervision of a Surveyor.

2.4.3.4 Tank venting systems are to be examined; flame arresters are to be opened as far as necessary, and cleaned.

2.4.3.5 Cargo tank heating systems are to be examined and pressure-tested to 1.5 times the operating pressure. (See Section 3, 3.1.5.4.4.)

2.4.3.6 The bilge systems of pump rooms are to be inspected and tested.

2.4.3.7 All ventilation systems in the cargo area including portable fans are to be examined and function-tested.

2.4.3.8 The following equipment is to be function-tested:

- Level indicators of cargo tanks
- Liquid level alarms
- Overflow controls
- Pressure and temperature alarms
- Remote-control systems of cargo pumps

- Sampling arrangements of cargo tanks, if fitted

2.4.4 Equipment for Operation in oil-covered Waters

The equipment for operation in oil-covered waters and the pertinent safety equipment have to be subject to thorough surveys and operational tests.

2.4.5 Electrical installations

In addition to the inspection and testings as per 2.3.5 the protection devices of electric motors are to be tested.

3. CHEMICAL TANKERS

3.1 General requirements

3.1.1 Range of application

3.1.1.1 The following arrangements relate to chemical tankers as defined in the BRS Construction Rules for Seagoing Ships, Chapter 7.

3.1.1.2 Unless otherwise stipulated in the following, the requirements of Section 3 apply.

3.1.1. In the case of chemical tankers also qualified as oil or product carriers additionally sub-section 1. is to be observed.

3.1.2 Scope of Surveys

3.1.2.1 The surveys are to cover all installations, outfit and equipment related to the carriage and handling of chemicals. They also cover the surveys required by the IMO Codes for Chemical Tankers.⁶

The protective equipment and the safety equipment required by the Codes for protection of the personnel as well as other equipment and outfit which are no class requirement items are not covered by the present Rules for Classification and Surveys. These items will, however, be included in the surveys, if compliance with the requirements of an Administration has to be certified. (See also the Rules, Chapter 7, Section 1).

Reference should be made to the procedures stated in the IBC Code regarding the authorization of recognized institutions, surveys and issuance, validity and extension of certificates. The "Certificate of Fitness" required for chemical tankers is issued either by the Administration of the vessel's flag state on the basis of BRS certificates or, if BRS is authorized by the respective flag state, by the Society itself.

3.1.2.2 Hull

⁶ "Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk" (BCH Code) for ships the keels of which were laid on or after 12.4.1972, and with some limitations, also for ships built before that date; "International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk" (IBC Code) for ships, the keels of which were laid on or after 1.7.1986.

The IBC Code is also part of MARPOL Convention (Annex II), and of SOLAS Convention 1974 (Chapter VII).

The following defines the minimum extent of examinations. The surveys shall be extended where substantial corrosion and/or structural defects are found, and will include an additional close-up survey (close visual inspection range, preferably within reach of hand) where deemed necessary by the Surveyor.

3.1.2.3 Repairs

Necessary repairs, see Section 2, 2.2.4.

3.1.3 Documents to be carried on board

The owner should supply and maintain on board documentation as specified under 3.1.3.1 and 3.1.3.2 which should be readily available for the surveyor. The documentation should be kept on board for the life time of the ship.

3.1.3.1 Survey Report File:

- Reports on structural surveys
- Executive Hull Summary²
- Thickness measurements reports²

The Survey Report File shall be available also in the Owners management office.

3.1.3.2 Supporting Documents

- Main structural plan of cargo and ballast tanks
- List of substances permitted to be carried (Annex I to "Certificate of Fitness")
- Previous repair history
- Cargo and ballast history²
- Extent of use of inert gas plant and tank² cleaning procedures
- Inspections by ship's personnel with reference to²
 - structural deterioration in general
 - leakage in bulkheads and piping
 - condition of coating or corrosion protection
- Survey Programme as required under 3.1.6² until the completion of the next Class Renewal Survey
- Any other information that will help to identify Suspect Areas requiring inspection.

3.1.4 Access to structures

3.1.4.1 The ship's spaces are to be made accessible, adequately lighted, freed from gas and cleaned, so that they may be properly examined without risk.

Where "soft coating"³ has been applied, it may be necessary to remove this coating, at least partially.

3.1.4.2 For close-up surveys in cargo and salt water ballast tanks, one or more of the following means

for access, acceptable to the Surveyor, is to be provided:

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

3.1.5 Survey at Sea

Upon prior agreement with the owner, BRS may carry out surveys at sea or at anchorage, provided the Surveyor is given the necessary assistance, including safety equipment, by the personnel on board. See also Section 3, 1.1.4.

3.1.6 Survey Programme²

For class renewal a special survey program (planning document) has to be prepared. In the case of chemical tankers exceeding 20.000 tdw this survey plan is to be prepared by the owner on the basis of the documentation elaborated on the occasion of the intermediate survey. The program is to be agreed with BRS Head Office in due time prior to commencement of the class renewal survey.

For chemical tankers up to 20.000 tdw the survey program is to be prepared when starting the class renewal survey.

For Chemical tankers more then 10 years of age ESP from last RS/2SS/ to be apply for Intermediate Survey.

3.2 Annual Surveys

3.2.1 General

3.2.1.1 In addition to the surveys as stipulated in Section 3, 3.1.1, the following installations, items of equipment and outfit as listed in 3.2.2 to 3.2.10 below are to be checked as to their perfect maintenance condition.

3.2.1.2 The annual survey is to ensure that the cargo handling installations and pertinent safety equipment are in good working order.

The surveys are preferably to be carried out during loading or discharging operations.

Access to cargo tanks or other spaces within the cargo area, necessitating gas-freeing will normally not be required unless necessary for checking items of equipment and installations for correct functioning.

3.2.2 Installations on the weather deck

3.2.2.1 On the weather deck the following equipment, if fitted, is to be surveyed and/or examined:

- cargo tank hatches, including sealings, covers and coamings
- tank gauging devices, level alarms and overflow controls with automatic closing valves
- pressure/vacuum relief valves and flame arresters of the cargo tank venting arrangements as well as devices for measuring the cargo tank vapour pressure
- flame arresters on vents to all bunker, oily ballast and oily slop tanks sampling devices of cargo cooling or heating installations as well as temperature measuring devices and temperature alarm systems
- pump discharge pressure gauges and the distinctive marking of pumps, valves and cargo piping.
- wheelhouse doors and wheelhouse windows, deckhouse and superstructure windows facing the cargo area (closing condition).
- electrical installations, see 3.2.4
- for fire-extinguishing systems, see 3.2.5.

3.2.2.2 The cargo handling installations (including spool pieces of the loading and unloading system, spray shields and drip trays, cargo hoses, etc.) arranged on the weather deck, possibly in the fore or aft area, are to be visually examined.

3.2.3 Pump rooms and pipe tunnels

Equipment in pump rooms and other enclosed spaces serving cargo handling operations, including pipe tunnels if fitted, is to be checked, in particular as to leakages and potential sources of danger (explosion protection), e.g.:

- condition of bulkheads and bulkhead penetrations (cracks, leakages)
- all piping systems including pressure gauges
- cargo bilge, ballast and stripping pumps for leakages, as far as practicable
- electrical and mechanical remote control and emergency stopping equipment (see also 3.2.4)
- ventilation systems
- rescue arrangements
- for fire-extinguishing systems, see 3.2.5.

3.2.4 Electrical installations

In gas-dangerous spaces and zones, the electrical equipment, including cables and their supports, is to be visually examined, particularly regarding explosion protection.

3.2.5 Fire extinguishing systems

The survey of the fire-extinguishing systems covers:

- external inspection of all systems for the cargo tank area
- checking of the foam fire-extinguishing and/ or water-spraying system on deck.

(See Section 3, 3.1.1.4)

3.2.6 Inert gas systems

The arrangements for inertising of cargo tanks and spaces surrounding cargo tanks and for padding of cargo tanks by filling with inert gas or dry air are to be examined as to their operability.

3.2.7 Ballast tanks

Sea water ballast tanks shall be surveyed, within annual surveys, as a consequence of findings on the occasion of an intermediate or class renewal survey; see Section 3, 3.1.2.2.

Regarding the renewal of coating see Section 3, 3.1.2.2.3.

In case of chemical tankers exceeding 15 years of age all sea water ballast tanks adjacent to a cargo or fuel oil tank with heating coils are to be examined internally.

If considered necessary by the Surveyor, thickness measurements are to be carried out, which are to be extended if substantial corrosion is found.

3.2.8 Miscellaneous

On the occasion of the annual survey also the following items, if fitted, are to be checked:

- special arrangements related to damage control (e.g. sliding bulkhead doors) in accordance with the approved damage control plan (also for tankers of less than 100 m in length)
- cargo sample stowage space
- gas detection instruments
- cargo information, safety instructions, etc., see 3.1.3.

3.2.9 Offshore supply vessels

Onboard supply vessels equipped for the carriage of dangerous or corrosive substances (class notation "Equipped for the carriage of chemicals in bulk"), the equipment employed for cargo handling and monitoring (piping, pumps, valves, safety equipment) is to be surveyed.

As far as accessible, spaces employed for storage are to be subjected to a general condition survey.

3.2.10 Waste chemical incinerator ships

Where severely corrosive wastes have been carried, in addition to the aforementioned surveys, inspections of all cargo tanks and of the cargo piping system are to be carried out for assessment of corrosion and possible damages to the coating. Analogously to Section 3, 3.2. thickness measurements are to be carried out.

3.3 Intermediate Surveys

3.3.1 General

3.3.1.1 In addition to the surveys and checks listed in 3.2 above, on the occasion of the second or third annual survey the checks listed below are to be performed. If deemed necessary by the Surveyor, functional test, pressure tests or thickness measurements are to be carried out in addition to the survey.

3.3.1.2 For chemical tankers exceeding 15 years of age the intermediate survey is to be carried out in drydock. For chemical tankers of 15 years of age or less, BRS may agree to a bottom in-water survey according to Section 3, 3.1.7 ⁶.

3.3.1.3 In case of ships exceeding 10 years of age the intermediate survey is to be enhanced to the scope of the preceding class survey according to 3.1.6 and 3.4. Testing of ballast and cargo tanks is not required unless deemed necessary by the attending Surveyor.

3.3.2 Installations in the cargo area

Irrespective of the vessel's age, all important piping systems in the cargo area are to be examined, e.g.:

- cargo, tank-cleaning, bunkering, ballast and steam pipings (if considered necessary by the surveyor, pressure testing or thickness measurements may be required)
- provisions for drainage of cargo tank vent lines
- cargo tank high velocity vent and pressure/ vacuum valves are to be function tested, and if deemed necessary by the Surveyor, to be opened up and re-adjusted.
- bonding devices of all piping systems and cargo tanks built-in independent from the hull
- cargo hoses (repeat test, if needed)
- cargo cooling systems
- tank heating systems
- spare parts for mechanical ventilation systems

3.3.3 Ballast and cargo tanks**3.3.3.1 Vessels 5 to 10 years of age:**

For tanks used for sea water ballast, an overall survey of representative spaces selected by the Surveyor is to be carried out. If such inspections reveal no visible structural defects, the examination may be limited to verifying whether the protective coating continues to be effective.

In the case of seawater ballast tanks the procedure as outlined in 1.3.3.1 (2nd paragraph) shall be followed, if applicable.

Regarding the renewal of coating see also Section 3, 3.1.2.2.3.

3.3.3.2 Vessels more than 10 years of age:**3.3.3.2.1** An overall survey is to be carried out of

- at least two representative cargo tanks

- all tanks for salt water ballast including combined cargo/ballast tanks.

If such inspections reveal no visible structural defects, the examination may be limited to verifying whether the protective coating continues to be effective.

3.3.3.2.2 Close-up surveys are to be carried out to the following extent:

- ballast tanks: Same as for previous class renewal survey
- cargo tanks: Preferably two combined cargo/ballast tanks. Extent of survey based on record of previous class renewal survey and repair history
- additionally, one cargo tank after the third class renewal survey. (Extent of survey as above for cargo tanks).

The extent of close-up surveys may be increased as stated under 3.4.2.2.2.

For areas in tanks where coatings are found to be in a good condition⁶ the extent may be specially considered by BRS.

3.3.3.3 In the case of seawater ballast tanks the procedure as outlined in 1.3.3.1 (2nd paragraph) shall be followed, if applicable.

Regarding the renewal of coating see also Section 3, 3.1.2.2.3.

3.3.4 Thickness measurements

Thickness measurements shall be carried out in areas found to be suspect during the previous class renewal survey.

Where substantial corrosion is found, the extent of the thickness measurements should be increased.

Authorization for thickness measurements see Section 3, 3.2.2.

3.3.5 Electrical installations

Irrespective of the vessel's age, the electrical equipment in gas-dangerous spaces and zones is to be examined with respect to the following:

- protective earthing (spot checks)
- integrity of certified safe-type equipment
- damages to outer sheath of cables
- function testing of pressurized equipment, and of associated alarms
- isolation resistance of circuits (only in gas-free or inerted condition). If proper test reports are available on board, the readings made by the crew may be accepted.

3.3.6 Inert gas systems

For ships with the class notation INERT, a survey according to BRS programme INERT 4 is to be carried out.

3.3.7 Offshore supply vessels

Onboard supply vessels equipped for the carriage of dangerous or corrosive substances, all tanks employed for the storage of such substances, including piping and fittings, have to be thoroughly examined for corrosion and possible damages to their coatings, where provided. The thickness measurements in these areas are to be conducted analogously to those of chemical tankers.

3.3.8 Waste chemical incinerator ships

In the case of waste chemical incinerator ships, the following checks are to be performed in addition to the aforementioned surveys:

- for ships aged 5 years and over all cargo tanks and cargo pipings are to be examined for corrosion. Thickness measurements are to be performed in accordance with Section 3, 3.2.
- for ships aged 5 years and over the steel structure of the incinerator, the insulation and brick lining are to be examined.
- irrespective of the vessel's age, the burners, auxiliaries and instruments, electrical installation, as well as ventilation fans and ducting, are to be examined for their general condition.

3.4 Class renewal surveys**3.4.1 General requirements**

3.4.1.1 In addition to the class renewal surveys of the ship's hull, the machinery plant and electrical installation as required by Section 3, 3.1.3 to 3.1.6, the structural elements, equipment and outfit including the cargo system and pertinent safety devices listed in 3.3 for intermediate survey are to be subjected to thorough examination and testing for proper functioning, at the Surveyor's discretion.

It is to be ensured that the relevant instructions and information material, such as cargo handling plans, cargo tank loading limit information, etc. are kept on board (see 3.1.3).

3.4.1.2 The class renewal survey of cargo handling installations and pertinent control, alarm and safety devices cannot normally be carried out during loading or discharging operations and is preferably to be carried out with the ship in gas-free condition.

3.4.1.3 Spaces and areas serving cargo handling operations (e.g. cargo control rooms and pump rooms) are to be examined with respect to their general condition and possible sources of danger. All accessible gas-tight bulkhead penetrations, including gas-tight shaft seals, are to be visually examined.

3.4.1.4 Regarding planning/survey programme, see 3.1.6.

3.4.1.5 The class renewal survey is to be held when the ship is in drydock or on a slipway, unless a drydocking survey has been carried out within the admissible period (see Section 3, 2.1.6.7). The ship is to be placed on blocks of sufficient height so that the keel, the bottom plating and the rudder can be examined.

3.4.1.6 For class renewal surveys of chemical tankers (hull), the "Continuous Class Renewal" procedure described in Section 3, 2.1.3.6 is excluded.

3.4.2 Hull

3.4.2.1 General requirements

3.4.2.1 All cargo tanks, sea water ballast tanks including double bottom tanks, pipe tunnels, cofferdams and void spaces bounding cargo holds, decks and outer hull are to be examined. The examination is to be sufficiently thorough for revealing substantial corrosion, significant deformations,

fractures, damages or other structural deteriorations.

The examination is to be supplemented by thickness measurements and tank testing as deemed necessary to ensure that the structural integrity continues to be given.

Regarding anticipated thickness measurements, see also Section 3, 3.2.3.5.

3.4.2.1.2 All piping systems on deck within the above spaces are to be examined and tested under working conditions to ensure their continued satisfactory condition.

Special attention is to be given to ballast piping in cargo tanks and cargo piping in ballast tanks and void spaces.

3.4.2.1.3 The survey extent of combined ballast/cargo holds is to be evaluated based on the records of ballast history, the corrosion protection system provided, and the extent of corrosion found, see 3.1.3.

3.4.2.2 Surveys

3.4.2.2.1 An **overall survey** of all tanks and spaces within the cargo area (excluding fuel oil, lubricating oil and fresh water tanks), as well as of the deck(s) and the shell is to be carried out, see 3.4.2.1.1.

The survey of stainless steel tanks is to be carried out as an overall survey and can be supplemented by a close-up survey as deemed necessary by the Surveyor. For fuel oil, lubricating oil and fresh water tanks the necessity for an overall survey is to be determined based on the ship's age.

3.4.2.2.2 Depending on the design and age of the ship, in general, **close-up surveys** shall be carried out at least according to the requirements shown in Table 4.5.

The surveyor may extend the close-up survey as deemed necessary taking into account the maintenance of the tanks under surveys and the condition of the corrosion protection system, and also in the following cases:

- in particular, tanks having structural arrangements or details which have suffered defects in similar tanks or on similar ships according to available information.
- tanks which have structures approved with reduced scantlings due to an approved corrosion control system.
- stainless steel tanks: see above
- pipes: see 3.4.2.3.5

For areas in tanks where coating and/or lining are found to be in a good condition, or where the tanks are made of stainless steel, the extent of close-up surveys according to Table 4.5 may be specially considered by the surveyor.

3.4.2.2.3 Corrosion protection

Coating and/or corrosion protection equipment, if fitted, are to be examined for their general condition and functioning. Detailed procedure (possible change to annual surveys), see Section 3, 3.1.2.2 and 1.3.3.1 (2nd paragraph).

Table 4.5 Class Renewal Surveys (Hull) of Chemical Tankers Minimum Requirements for Close-up Surveys

Class renewal survey No.			
I. age ≤ 5 y.	II. 5 < age ≤ 10 y.	III. 10 < age ≤ 15 y.	IV. and subsequent, age > 15 y.
Structural members of one transverse section 1) in a ballast wing tank or a ballast double hull tank (side and bottom tank, even though these tanks are separate) One deck transverse 2) in a cargo tank, or on deck	All plating and internal structure, in a ballast wing tank or ballast double hull tank (side and bottom tank) Deck structure also externally One deck transverse in each remaining ballast tank, or on deck One deck transverse, each, - in a cargo wing tank, - in two cargo center tanks, or corresponding transverse on deck	All plating and internal structure, in all ballast tanks (Deck structure also externally) All plating and internal structure, in a cargo wing tank Structural members of one transverse section 1) in each remaining cargo tank	
One transverse bulkhead (lower part), including adjacent structural members, - in a ballast tank - in a cargo wing tank - in a cargo center tank	Both transverse bulkheads (complete), including adjacent struct. members, in a ballast wing tank or double hull tank (side and double hull tank) One transverse bulkhead (lower part), including adjacent struct. members, - in each remaining ballast tank - in a cargo wing tank - in two cargo center tanks	All transverse bulkheads (complete), including adjacent structural members, in all cargo tanks	
1) Complete transverse web frame ring, where provided, including adjacent struct. members 2) Deck transverse girder, including adjacent deck plating and struct. members			

3.4.2.3 Thickness measurements

3.4.2.3.1 The minimum requirements for thickness measurements on the occasion of class renewal surveys are stated in Table 4.6, depending on the ship's age.

Extended measurements may be required, e.g. for areas with substantial corrosion, and/or according to the statements in the survey programme, see 3.1.6. The thickness measurements should be witnessed by the Surveyor to the necessary extent.

3.4.2.3.2 For areas in spaces where coating and/or lining are found to be in good condition⁶, or where the cargo tanks are made of stainless steel, the extent of thickness measurements according to Table 4.6 may be specially considered by the surveyor.

3.4.2.3.3 The selected transverse sections should include all continuous longitudinal structural elements. The sections are to be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

Table 4.6 Class Renewal Surveys (Hull) of Chemical Tankers Minimum Requirements for Thickness Measurements

Class renewal survey No.			
I. age ≤ 5 y.	II. 5 < age ≤ 10 y.	III. 10 < age ≤ 15 y.	IV. and subsequent, age > 15 y.
One section of deck plating for the full beam of the ship within the cargo area (preferably in way of a ballast tank, if any, or a cargo tank used primarily for water ballast)	Within the cargo area: a) Each deck plate b) Three transverse sections	Within the cargo area: a) Each deck plate b) Three transverse sections	Within the cargo area: a) Each deck plate b) Three transverse sections c) Each bottom plate
Measurements of structural members subject to close-up survey according to Table 4.4, for general assessment and recording of corrosion pattern			
Suspect areas			
	Selected wind and water strakes, outside the cargo area		
	All wind and water strakes within the cargo area		

3.4.2.3.4 Three sections are to be measured. At least one is to include a ballast tank within 0,5 L amidships.

3.4.2.3.5 For chemical tankers exceeding 10 years of age, selected cargo pipes outside cargo tanks and ballast pipes passing through tanks are to be subjected to random thickness measurements, and selected pipe lengths opened for inspection if deemed necessary.

3.4.2.3.6 Regarding thickness measurements, see also Section 3, 3.2. For chemical tankers, which are also qualified as oil or product tankers, see also 1.4.2.3.4.

3.4.2.4 Pressure tests

3.4.2.4.1 In general, pressure tests are to be carried out in line with Table 4.7. Depending on the design and use of the tanks, the surveyor may accept deviations (e.g. correctly documented recent pressure tests of cargo tanks carried out by the crew) or require additional tests to be carried out.

3.4.2.4.2 For the pressure heads, see Section 3, 3.1.3.2.1.4.

3.4.2.4.3 For chemical tankers exceeding 10 years of age, selected cargo pipes outside cargo tanks and ballast pipes passing through cargo tanks are to be pressure tested to the maximum working pressure.

3.4.3 Cargo area equipment

3.4.3.1 Cargo and ballast piping systems, including valves and fittings, are to be internally inspected for corrosion, as deemed necessary by the Surveyor. Subsequently, a pressure test is to be carried out.

Table 4.7 Class Renewal Surveys (Hull) of Chemical Tankers Minimum Requirements for Tank Testing

Class renewal survey No.			
I. age $\leq$ 5 y.	II. 5 < age $\leq$ 10 y.	III. 10 < age $\leq$ 15 y.	IV. and subsequent, age > 15 y.
Cargo tank boundaries facing void spaces, pipe tunnels, representative fuel oil tanks, pump rooms or cofferdams			
	All cargo tank bulkheads which form the boundaries of segregated cargoes	All remaining cargo tank boundaries	
All ballast tank boundaries			

3.4.3.2 Cargo, stripping and ballast pumps are to be examined and checked. Pressure-relief valves of pumps are to be function-tested.

3.4.3.3 Cargo tank high velocity vent and pressure/ vacuum valves are to be overhauled, adjusted by makers/recognized firm and tested under supervision of a Surveyor.

3.4.3.4 Tank venting systems are to be examined; flame arresters are to be opened as far as necessary, and cleaned.

3.4.3.5 Cargo tank heating systems are to be examined and pressure-tested to 1.5 times the operating pressure. (Cf. Section 3, 3.1.5.4.4).

3.4.3.6 All ventilation systems in the cargo area, including portable fans, are to be examined and function-tested.

3.4.3.7 The following equipment is to be function-tested:

- level indicators of cargo tanks
- liquid level alarms
- overflow controls
- pressure and temperature alarms
- remote-control systems of cargo pumps
- bilge systems of pump rooms and cofferdams
- sampling arrangements of cargo tanks, if fitted

- inert gas systems, if the survey is due (cf. 3.3.5)
- bilge systems of pump rooms.

3.4.4 Electrical installations

In addition to the inspections and testings as per 3.3.4, the protection devices of electric motors are to be tested.

4. LIQUEFIED GAS TANKERS

4.1 General requirements

4.1.1 The following arrangements relate to liquefied gas tankers as defined in the BRS Construction Rules for Seagoing Ships, Chapter 6.

4.1.2 Unless otherwise stipulated in the following, the requirements in Section 3 apply.

4.1.3 The surveys are to cover all installations, outfit and equipment related to the carriage and handling of liquefied gases. They also cover the surveys required by the IMO Codes for Liquefied Gas Tankers.⁷

The fire protection equipment and the safety equipment required by the Codes for protection of the personnel as well as other equipment and outfit which are no class required by the Codes for protection of the personnel as well as other equipment and outfit which are no class requirement items are not covered by the present Rules for Classification and Surveys. These items will, however, be included in the surveys, if compliance with the requirements of an Administration has to be certified.

4.1.4 The ship's spaces and tanks are to be made accessible, adequately lighted, freed from gas and cleaned, so that they may be properly examined without risk.

4.1.5 For ships of special design, the survey intervals and procedures will be specially considered.

4.2 Annual surveys

4.2.1 General

4.2.1.1 In addition to the surveys as per Section 3, 3.1.1, the components, equipment and outfit as listed below in 4.2.2 to 4.2.9 are to be examined as to whether they are in unobjectionable maintenance condition.

4.2.1.2 The annual survey is to ensure that the cargo handling installations and pertinent safety equipment are in good working order. The annual survey is preferably to be carried out during a loading or discharging operation. Access to cargo tanks or inertised cargo holds, necessitating gas-freeing/aerating will normally not be required unless deemed necessary by the Surveyor in specific cases.

⁷ "Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk" (GC Code) for ships ordered after 31.10.1976, but before 1.7.1986; "Code for Existing Ships Carrying Liquefied Gases in Bulk" for ships ordered before 31.10.1976; "International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk" (IGC Code) for ships the keel of which is laid on or after 1.7.1986.

The IGC-Code is part of SOLAS Convention 1974 (Chapter VII).

4.2.1.3 The second annual survey during each period of class, or the third at the latest will be carried out in the form of an "intermediate survey" in accordance with a programme covering a wider scope; see 4.3.

4.2.1.4 Spaces and areas used in connection with cargo handling (e.g. cargo control rooms, air-locks, compressor rooms), are to be examined with respect to their general condition and maintenance. All accessible gas-tight bulkhead penetrations, including tight shaft sealings, are to be visually examined.

4.2.2 Cargo handling systems

4.2.2.1 The cargo and process pipings, expansion joints, cargo hoses and machinery, such as heat exchangers, vapourizers, pumps, compressors are to be visually examined.

4.2.2.2 The availability of the required spool pieces for piping separation is to be verified.

4.2.2.3 The log books are to be examined with regard to correct functioning of the cargo containment and cargo handling systems. The running hours per day of the reliquefaction plant or the boil-off rate and the inert gas consumption are to be considered.

4.2.2.4 It is to be ensured that the relevant instructions and information material, such as cargo handling plans, cargo tank loading limit information, cooling-down procedures, etc. are on board.

4.2.3 Cargo containment venting systems

4.2.3.1 Venting systems for the cargo tanks, inter barrier spaces (in case of Type A tanks, cargo holds) are to be visually examined. It is to be verified that the cargo tank relief valves are sealed and that the certificate containing details on opening/closing pressures of the relief valves is on board.

4.2.3.2 Protection screens and flame arresters, if fitted, are to be examined for corrosion and cleanliness.

4.2.4 Instrumentation and safety systems

4.2.4.1 The monitoring and control equipment for pressure, temperature and liquid levels is to be verified as to its good working order, by one or several of the following methods:

- Visual external examination
- Comparison of read-outs of different indicators
- Comparison of read-outs with the data of the cargo actually handled
- Examination of repair and maintenance records with reference to the cargo plant repair and maintenance manual.

4.2.4.2 Emergency shut-down valves at shore connections and tanks are to be tested without flow in the pipe lines. It is to be verified that operation of the emergency shut-down system will cause the cargo pumps and compressors to stop.

4.2.4.3 The fixed and portable gas detection equipment, including indicators and alarms, is to be tested for correct functioning.

4.2.5 Electrical installations

In gas-dangerous spaces and zones the electrical equipment, including the cables and their supports, is

to be visually examined, particularly regarding explosion protection.

4.2.6 Ventilation systems

Ventilation systems for all spaces in the cargo area, including cargo pump rooms, cargo compressor rooms, electric motor rooms, cargo control rooms and other spaces used for cargo handling operations are to be examined as to their satisfactory operating condition.

4.2.7 Inert gas and dry air systems

Inert gas/dry air systems, including the means for prevention of back-flow of cargo vapour to gas-safe spaces are to be checked as to their satisfactory operating condition.

4.2.8 Fire-fighting systems

All systems in the cargo tank area, including the compressor room, are to be checked visually. See also Section 3, 3.1.1.4.

4.2.9 Miscellaneous

The following items of equipment are to be inspected for their condition and correct functioning:

- means for ensuring gas-tightness of the wheelhouse windows and doors, windows in end bulkheads of superstructures and deckhouses facing the cargo area or stern loading/unloading arrangements, and closing devices of all air intakes and openings into accommodations, service and control stations.
- sealing arrangements for tanks or tank domes penetrating decks or tank covers.
- drip trays or insulation for deck protection against cargo leakage.
- arrangements for heating of hull structural elements, if any. Access to heated cofferdams, etc. is normally not required.
- electric bonding of cargo piping systems.
- arrangements for the use of boil-off gas as fuel, including alarm and safety systems.

4.3 Intermediate surveys

4.3.1 General

4.3.1.1 In addition to the surveys and checks as stipulated in 4.2 irrespective of the vessel's age, unless expressly stated otherwise, the checks mentioned below are to be carried out on the occasion of the second or third annual survey.

The intermediate survey supplements the preceding annual survey by testing of the cargo handling installations, with pertinent automatic controls, alarm and safety systems, for their correct functioning.

4.3.1.2 For some of the surveys and checks to be carried out within the scope of the intermediate survey, the ship is required to be in gas-free condition. They may be carried out on the occasion of drydocking.

4.3.2 Cargo systems, tanks

Bonding of tanks and pipes is to be controlled.

4.3.2.1 It is to be checked whether the ship's cargo hoses are of approved type and in satisfactory condition.

At intervals not exceeding 2.5 years, the cargo hoses are to be subjected to pressure and conductivity tests.

4.3.2.2 Weather deck

The piping systems essential for operation of the ship, e.g. cargo transfer, bunker and ballast lines, are to be examined. Cf. 3.3.3.

4.3.2.3 On ships of 10 years of age and over, which have carried products other than those listed in the IMO-Certificate of Fitness, two selected cargo tanks, if of the integral type, and selected double bottom or ballast spaces, if any, are to be internally inspected.

The piping system in the cargo tanks is to be examined.

4.3.3 Cargo containment venting systems

4.3.3.1 The drainage arrangements of the venting systems are to be examined.

4.3.3.2 If the cargo tanks are equipped with relief valves with non-metallic membranes in the main or pilot valves, such membranes are to be replaced by new ones and the valves are to be adjusted, function-tested, and sealed.

These measures need not be taken simultaneously with the intermediate survey, provided that the non-metallic membranes are renewed at intervals not exceeding 3 years.

4.3.4 Instrumentation and safety systems

4.3.4.1 The alarm, control and safety systems of the cargo installation are to be visually examined and tested by varying pressure, temperature and liquid level, as far as practicable, and comparisons are to be drawn, using test instruments. Simulated testing may be accepted for sensors which are not accessible or for sensors located within cargo tanks or inertised cargo holds. This test is to include testing of alarm and safety functions.

4.3.4.2 The gas detection equipment, including indicators and alarms, is to be tested for correct functioning. The piping of the gas detection system is to be visually inspected for corrosion and damages. The tightness and integrity of the suction lines between suction points and analyzing units is to be verified as far as possible.

4.3.4.3 On ships having arrangements for the use of boil-off gases as fuel, the safety, control, alarm and shut-down systems are to be checked. The extent of the checks will be determined from case to case.

4.3.5 Electrical installations

Electrical equipment in gas-dangerous spaces and zones is to be examined in respect of the following:

- protective earthing (spot checks)
- integrity of certified safe-type equipment

- damage to outer sheath of cables
- function-testing of pressurized equipment and associated alarms
- testing of systems for de-energizing non-certified safe electrical equipment located in spaces protected by air-locks, such as electric motor rooms, cargo control rooms, etc.
- checking of insulation resistance of circuits. Relevant measurements are only to be made when the ship is in gas-free or inertised condition. If proper test reports are available on board, readings made by the crew may be accepted.
- when the ship is in gas-free condition, it is to be verified that the cargo tanks are electrically bonded to the hull.

4.3.6 Inert gas system

The inert gas installation is to be tested in accordance with BRS programme INERT 4.

4.4 Class renewal surveys

4.4.1 General requirements

In addition to the surveys and inspections referred to in 4.3 and in Section 3, 3.1.3, the examinations and tests as mentioned in 4.4.2 to 4.4.8 below are to be performed.

4.4.2 Cargo containment system

4.4.2.1 Surveys

4.4.2.1.1 All cargo tanks are to be inspected internally.

Where applicable, inspections performed between the class renewals may be recognized.

4.4.2.1.2 As far as practicable, the outer surface of uninsulated cargo tanks or the outer surface of cargo tank insulations, including vapour or protective cover if any, is to be examined, as are areas in way of supports, keys and anti-flotation chocks. Partial removal of insulation may be required in order to verify the condition of the tank or the insulation itself, if found necessary by the Surveyor. Where, e.g. in the case of membrane-type cargo tanks, the insulation arrangement is such, that it cannot be examined, the surrounding structures of wing tanks, double bottom tanks and cofferdams are to be examined for cold spots when the cargo tanks are in cold condition. This examination may be dispensed with if the log book, together with the monitoring instruments, gives sufficient evidence of the integrity of the insulation system.

4.4.2.2 Non-destructive tests

4.4.2.2.1 Thickness measurements of the cargo tanks may be required, if deemed necessary by the Surveyor.

4.4.2.2.2 Non-destructive testing of the main structural members, tank shell and highly stressed parts, including welded connections is to supplement cargo tank inspection as far as deemed necessary by the Surveyor. The following items are inter alia considered as highly stressed parts:

- cargo tank supports and longitudinal and transverse securing devices
- y-connections between tank shell and longitudinal bulkhead of lobe tanks

- web frames or stiffening rings
- swash bulkheads and their fixations
- dome and sump connections to tank shell
- foundations for pumps, towers, ladders, etc.
- pipe connections.

4.4.2.2.3 For independent Type B tanks, the extent of non-destructive testing is defined in a programme specially prepared for the particular cargo tank design.

4.4.2.3 Tightness tests

4.4.2.3.1 The tightness of all cargo tanks is to be verified by an appropriate procedure. Provided that the effectiveness of the ship's gas detection equipment has been confirmed, it will be acceptable to utilize this equipment for the tightness test of independent tanks below deck during the first process of filling of the cargo tanks subsequent to the class renewal survey. Where applicable, inspections performed between the class renewals may be recognized.

4.4.2.3.2 Where the findings of checks according to 4.4.2.1 to 4.4.2.3.1 or an examination of the log book raise doubts as to the structural integrity of a cargo tank, a hydrostatic or hydropneumatic test is to be carried out. For integral tanks and for independent Type A and B tanks, the test pressure at the top of tank is to correspond to the MARVS (maximum allowable relief valve setting) of the tank. For independent Type C tanks, the test pressure at the top of tank is not to be less than 1.25 times the MARVS.

4.4.2.4 Extended tests

At intervals of 10 years and on the occasion of class renewal surveys Nos. II, IV, VI, etc., all independent Type C tanks are to be either:

- hydrostatically or hydropneumatically tested to a pressure at upper edge of tank of 1.25 times MARVS and thereafter, nondestructively, in accordance with 4.4.2.2.2/ 4.4.2.2.3
- or
- subjected to a thorough, systematically planned non-destructive testing procedure. These tests are to be carried out in accordance with a programme specially prepared for the particular tank design.

If a special programme does not exist, the following applies with regard to non-destructive testing:

Testing shall be concentrated on the detection of surface cracks in welded connections in highly stressed areas, as listed in 4.4.2.2.2.

At least 10 % of the length of the welded connections in each of the above mentioned areas are to be tested. This testing is to be carried out internally and externally, as far as practicable.

Insulation is to be removed as necessary for the required non-destructive testing.

4.4.2.5 Tank supporting structures and insulation, secondary barrier

4.4.2.5.1 As far as practicable, all hold spaces and hull insulation (if provided), secondary barriers

and tank supporting structures are to be visually examined. The secondary barrier of all tanks is to be checked for its effectiveness by means of a pressure/vacuum test, a visual examination or some other acceptable method.

4.4.2.5.2 For membrane and semi-membrane tank systems inspection and testing as per 4.4.2.5.1 are to be carried out in accordance with programmes specially prepared in accordance with an approved method for the actual tank system.

4.4.2.6 Pressure and vacuum relief valves

4.4.2.6.1 The pressure relief valves for the cargo tanks are to be opened for examination, adjusted, function-tested and sealed. The requirements of 4.3.3.2 regarding replacement of non-metallic membranes apply. The following tolerances apply regarding the set pressures of the cargo tank pressure relief valves:

Set pressure	Tolerance
0 bar to 1,5 bar	± 10%
1.5 bar to 3,0bar	± 6%
≥ 3.0 bar	± 3%

4.4.2.6.2 Pressure/vacuum relief valves, rupture discs and other pressure relief devices for inter-barrier spaces and hold spaces are to be examined, opened and tested if necessary, depending on their design.

4.4.2.7 Electric bonding

It is to be verified that the cargo tanks are electrically bonded to the hull.

4.4.3 Piping systems

4.4.3.1 The cargo, liquid nitrogen and process piping systems, including their valves and actuators, compensators etc., are to be opened for examination as deemed necessary by the Surveyor. Insulation is to be removed as deemed necessary to ascertain the external condition of the pipes. At the Surveyor's discretion welded seams at branches and bends are to be subjected to nondestructive random crack tests. If the visual examination raises doubts as to the integrity of the pipelines, the pipeline is to be pressure-tested to 1.25 times the MARVS. After reassembly the complete piping system is to be tested for leaks.

4.4.3. The pressure relief valves in the piping systems are to be function-tested. A random selection of valves is to be opened for examination and adjusted.

4.4.3.3 Cargo pumps, booster pumps and gas compressors are to be inspected and tested.

4.4.4 Reliquefaction installation

4.4.4.1 The parts of the compressors subject to wear, such as cylinders, pistons, connecting rods, glands, bearings, auxiliary machinery components, such as the shafts, rotors and diffusers of centrifugal pumps, etc., are to be examined.

4.4.4.2 The drives of the compressors, including those components which are required for operation of the drives, are to be inspected.

4.4.4.3 All covers of the heat exchangers are to be dismantled for inspection of the pipe plates and pipes. After renewal of pipes or pipe plates, if necessary, pressure and tightness tests are to be conducted. If only a few pipes have been exchanged, a tightness test may be sufficient.

4.4.4.4 The safety equipment (pressure relief valves, rupture discs) is to be checked.

4.4.5 Process pressure vessels

At class renewal surveys Nos. II, IV, VI, etc. all process pressure vessels are to be tested pneumatically at a pressure equal to 1.1 times the working pressure, unless the result of the survey

requires a hydraulic pressure test to 1.5 times the working pressure.

4.4.6 Equipment for the use as fuel of gases evaporated from the LNG cargo

4.4.6.1 The gas conditioning plant is to be inspected externally.

4.4.6.2 The pipe or duct enclosing the gas fuel line is to be inspected for leaks. The ventilation system of that pipe or duct as well as the inertising equipment of a double-wall piping system are to be checked for their operability.

Heat exchangers are to be visually examined internally.

4.4.6.3 Safety devices

See 4.3.4

4.4.7 Electrical installation

In addition to the visual examinations and tests as per 3.5, the protection devices of electric motors are to be tested.

4.4.8 Miscellaneous

4.4.8.1 Drainage systems for removal of water or cargo from inter-barrier spaces and hold spaces are to be examined and tested where necessary.

4.4.8.2 All gas-tight bulkheads are to be inspected. The effectiveness of gas-tight shaft sealings is to be verified.

4.4.8.3 It is to be checked whether the spare parts stipulated are kept on board.

4.4.8.4 Any installations for heating of hull structures are to be examined for correct functioning.

5. BULK CARRIERS

5.1 General Requirements

5.1.1 Application

5.1.1.1 The following requirements refer to the steel structure and related piping systems of all self-propelled bulk carriers, in way of cargo holds, cofferdams, pipe tunnels and void spaces within the cargo area, and to all ballast tanks.

5.1.1.2 Unless otherwise stated in the following, the arrangements as per Section 3 apply.

5.1.1.3 For bulk carriers also designed for the carriage of crude oil, sub-section 1. will

have to be observed as well.

5.1.2 Extent of surveys

The following defines the minimum extent of examinations. The surveys are to be extended where substantial corrosion and/or structural defects are found, and will include an additional close-up survey (close visual inspection range, preferably within reach of hand) where deemed necessary by the Surveyor.

5.1.2.1 Repairs

Necessary repairs, see Section 2, 2.2.4.

5.1.3 Documents to be carried on board

The owner should supply and maintain on board documentation as specified under 5.1.3.2 and 5.1.3.3 which should be readily available for the surveyor. The documentation should be kept on board for the life time of the ship.

5.1.3.1 Survey Report File:

A Survey Report File is to be part of the documentation on board consisting of:

- Reports on structural surveys
- Executive Hull Summary
- Thickness measurements reports

The Survey Report File is to be available also in the Owners management office.

5.1.3.2 Supporting Documents:

- Main structural plan of cargo holds and ballast tanks
- Previous repair history
- Cargo and ballast history ²
- Inspections by ship's personnel with reference to ²
 - structural deterioration in general
 - leakage in bulkheads and piping
 - condition of coating or corrosion protection
- Survey Programme as required under 5.1.6 ² until such time as the Class Renewal Survey has been completed
- Any other information that will help to identify Suspect Areas requiring inspection.

5.1.4 Access to Structures

5.1.4.1 Regarding accessibility to spaces, absence of gases, removal of residual cargo and rust, and in respect of lighting, the ship is to be prepared such as to enable it to be duly examined without

any risk.

Where "soft coating"³ has been applied, it may be necessary to remove this coating, at least partially.

5.1.4.2 For close-up surveys in cargo holds and sea water ballast tanks, one or more of the following means for access, acceptable to the Surveyor, is to be provided:

- permanent staging and passages through structures
- temporary staging, e.g. ladders and passages through structures
- lifts and moveable platforms – other equivalent means.

5.1.5 Survey at Sea

Upon prior agreement with the owner, BRS may carry out surveys at sea or at anchorage, provided the Surveyor is given the necessary assistance by the personnel on board. See also Section 3, 1.1.4.

5.1.6 Survey Programme

For class renewal a special survey programme (planning document) has to be prepared. In the case of bulk carriers exceeding 20.000 tdw this survey plan is to be prepared by the owner on the basis of the documentation elaborated on the occasion of the intermediate survey. The programme is to be agreed with BRS Head Office in due time prior to commencement of the class renewal survey.

For bulk carriers up to 20.000 tdw the survey programme is to be prepared when starting the class renewal survey.

For Bulk carriers more 10 years of age applies ESP from last Renewal survey during the Intermediate Survey.

5.1.7 Additional Safety Measures

5.1.7.1 For bulk carriers of 150 m in length and above, a strength calculation of the internal structure of the double bottom and hold No. 1 and of the corrugated transverse bulkhead between holds No. 1 and 2 have to be carried out for the flooding condition, where:

- the foremost hold is bounded by the side shell only for ships which were contracted for construction prior to 1 July 1998.
- the foremost hold is double skin construction of less than 760 mm breadth, the keel of which were laid, or which were a similar stage of construction, before 1 July 1999.

This applies to bulk carriers, in the foremost cargo hold, intended to carry solid bulk cargoes having a density of 1,78 t/m³, or above, with single deck, topside tanks, hopper tanks.

5.1.7.2 The due date for the strength calculation depends on the age of the vessel. Compliance is required:

- for ships which were 20 years of age or more on 1 July 1998, by the due date of the first intermediate, or the due date of the first Class Renewal Survey to be held after 1 July 1998, whichever comes first
- for ships which were 15 years of age or more but less than 20 years of age on 1 July 1998, by the due date of the first Class Renewal Survey to be held after 1 July 1998, but not later than 1 July 2002

- for ships which were 10 years of age or more but less than 15 years of age on July 1 1998 by the due date of the first intermediate, or the due date of the first Class Renewal Survey to be held after the date on which the ship reaches 15 years of age but not later than the date on which the ship reaches 17 years of age
- for ships which were 5 years of age or more but less than 10 years of age on July 1 1998 by the due date, after 1 July 2003, of the first intermediate, or the due date of the Class Renewal Survey after the date on which the ship reaches 10 years of age, whichever occurs first
- for ships which were less than 5 years of age on 1 July 1998, by the date on which the ship reaches 10 years of age

Completion, prior to 1 July 2003, of an intermediate or Class Renewal Survey with a due date after 1 July 2003, cannot be used to postpone compliance. However, completion prior to 1 July 2003 of an intermediate survey the window for which straddles 1 July 2003 can be accepted.

In connection with this strength calculation additional thickness measurements have to be taken of the aforementioned structures. Repairs and strengthening required are to be approved by BRS. Strength calculations are to be performed at all subsequent Class Renewal Surveys.

5.1.7.3 The requirements 5.1.7.1 and 5.1.7.2 are to be applied in conjunction with the damage stability requirements as specified in SOLAS Reg. XII/4.2 to 4.6.

5.1.7.4 For bulk carriers of 150 m in length and above of single side skin construction, i.e. bulk carriers where one or more cargo holds are bound by the side shell only or by two watertight boundaries, one of which is the side shell, which are:

- less than 760 mm apart in bulk carriers, the keels of which are laid or which are at a similar stage of construction before 1 January 2000
- less than 1000 mm apart in bulk carriers, the keels of which are laid or which are at a similar stage of construction on or after 1 January 2000, but not complying with SOLAS Reg. XII/ 4.2 to 4.6 an approved permanent means of detecting the presence of water in the cargo holds in excess of the small amounts which may be normally expected in the bilge wells is to be provided in addition to the bilge well high water level alarm required by SOLAS XII Reg. 9.

5.1.7.5 Bulk carriers which were not built in accordance with the particular requirements ⁸ for evaluation of the scantlings of hatch covers and hatch coamings of cargo holds, and are fitted with steel hatch cover, securing devices and stoppers for cargo hold hatchways within 0,25 L of the fore perpendicular, except pontoon type hatch covers are to comply with the additional requirements ⁹ for cargo hatch covers securing arrangements in accordance with the following schedule:

- for ships which will be 15 years of age or more on 1 January 2004 by the due date of the first intermediate or Class Renewal Survey after that date
- for ships which will be 10 years of age or more on 1 January 2004 by the due date of the first 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.

⁸ For requirements see UR S 21 of IACS

⁹ For requirements see UR S 30 of IACS

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

Panel hatch covers are to be secured by appropriate devices, such as bolts, wedges or similar, suitably spaced alongside the coamings and between cover elements.

5.1.7.6 Bulk carriers which were not built in accordance with the particular requirements¹⁰ for side structures in single side bulk carriers are to be assessed for compliance. Steel renewal,

reinforcement or coating for the web and flanges of the side frames and brackets, were required, is to be carried out in accordance with the following schedule:

- for ships which will be 15 years of age or more on 1 January 2004 by the due date of the first intermediate or Class Renewal Survey after that date
- for ships which will be 10 years of age or more on 1 January 2004 by the due date of the first Class Renewal Survey after that date
- for ships which will be less than 10 years of age or more 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 an intermediate survey the window for which straddles 1 January 2004 can be accepted.

Where bulk carriers are reinforced to comply with an ice class Notation, the intermediate frames will not be included when considering compliance with the requirements¹¹.

In connection with this, additional thickness measurements and strength calculations have to be performed for the aforementioned structures. Repairs and strengthening required are to be approved by BRS. Strength calculations are also to be performed at all subsequent Class Renewal Surveys.

5.2 Annual surveys

5.2.1 General

The survey is to ensure that the hull, hatch covers, coamings and piping are maintained in satisfactory condition, see also Section 3, 3.1.1.2. Prior to inspection, the Surveyor shall examine the documentation required to be kept on board for this type of vessel, as a basis for the survey, see 5.1.3.

5.2.2 Hatch covers, coamings

5.2.2.1 For mechanically operated steel covers, the satisfactory condition of all structural elements, guides, clamping and retaining devices and of the tensioning/ moving system including the hydraulic installation shall be checked.

In case of portable hatch covers and wooden or steel pontoon-type covers, correspondingly, the condition of all fixed and loose load bearing and securing elements and of the devices ensuring watertight integrity of the vessel shall be examined.

5.2.2.2 The hatch cover plating and the hatch coamings including stiffeners are to be close-up surveyed.

¹⁰ For requirements see UR S 12 of IACS

¹¹ For requirements see UR S 31 of IACS

5.2.2.3 Random checking of the operation of the hatch covers is to be carried out, in order to ascertain the satisfactory stowage in open condition, proper fit and efficiency of sealing in closed condition, and safe functioning of hydraulic and power components and connecting elements.

5.2.2.4 The Surveyor shall check whether since the last survey any unapproved changes or repairs have been made to the hatch covers, hatch coamings and the securing and sealing devices.

5.2.3 Cargo holds

5.2.3.1 For bulk carriers up to 10 years of age, an overall survey of a representative forward and

aft cargo hold is to be carried out. Where this level of survey reveals the need for remedial measures, the survey is to be extended to all cargo holds (overall survey, general condition).

5.2.3.2 For bulk carriers over 10 years of age the following is required:

- overall survey of all cargo holds
- close-up examination of sufficient extent (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 the forward cargo hold. Where this survey reveals the need for remedial measures, the survey is to be extended to include a close-up survey of all the shell frames and adjacent shell plating of that cargo hold as well as close-up survey of sufficient extent of all remaining cargo holds.
- thickness measurements, where considered necessary by the Surveyor. If the measurements indicate substantial corrosion, the extent of measurements is to be increased.

5.2.3.3 For bulk carriers over 15 years of age, a close-up survey of one more selected cargo hold is to be carried out, in addition to the surveys indicated in 5.2.3.2 and with the same extent. Consequent measures in case of damages, and thickness measurements: See 5.2.3.2.

5.2.3.4 Where a coating applied to a cargo hold in accordance with new building requirements is in acceptable condition or where the cargo hold is coated or recoated to an extent corresponding to new building requirements, this may be taken into account when fixing the extent of close-up surveys and thickness measurements.

Prior to coating or recoating of the cargo holds the existing scantlings of structural members are required to be ascertained by thickness measurements.

5.2.3.5 Extent of additional annual survey for the foremost cargo hold of ships of 150 m in length and upwards, over 5 years of age, and subject to SOLAS XII/9.1

5.2.3.5.1 For bulk carriers of 5 to 15 years of age:

- An overall survey of the foremost cargo hold, including close-up survey of sufficient extent, minimum 25 % of frames, is to be carried out to establish the condition of:
- shell frames including their upper and lower end attachments, adjacent shell plating, and transverse bulkheads
- areas found suspect at the previous Class Renewal Survey
- Where considered necessary by the surveyor as a result of the overall and close-up survey as described above, the survey is to be extended to include a Close-up Survey of all of the

shell frames and adjacent shell plating of the cargo hold.

5.2.3.5.2 For bulk carriers exceeding 15 years of age:

An overall survey of the foremost cargo hold, including close-up survey is to be carried out to establish the condition of:

- all shell frames including their upper and lower end attachments, adjacent shell plating, and transverse bulkheads
- areas found suspect at the previous Class Renewal Survey

5.2.3.5.3 Thickness measurement is to be carried out to an extent sufficient to determine both general and local corrosion levels at areas subject to close-up survey, as described in 5.2.3.5.1 a) and b) and 5.2.3.5.2 above.

The minimum requirement for thickness measurements are areas found to be suspect areas at the previous Class Renewal Survey.

Where substantial corrosion is found, the extent of thickness measurements shall be increased.

5.2.3.5.4 The thickness measurement may be dispensed with provided the surveyor is satisfied by the close-up survey, that there is no structural diminution and the protective coating where fitted remains effective.

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

5.2.4 Ballast tanks

Sea water ballast tanks shall be surveyed, within annual surveys, as a consequence of findings on the occasion of an intermediate or Class Renewal Survey, see Section 3, 3.1.2.2.

When considered necessary by the Surveyor, thickness measurements are to be carried out. If these measurements indicate substantial corrosion, the extent of thickness measurements is to be increased.

5.3 Intermediate Surveys

5.3.1 General

5.3.1.1 In addition to the surveys and checks listed in 5.2 above, on the occasion of the second or third annual survey the checks listed below are to be performed. If deemed necessary by the Surveyor, functional test, pressure tests or thickness measurements are to be carried out in addition to the survey.

5.3.1.2 For bulk carriers exceeding 15 years of age the intermediate survey is to be carried out in drydock. For bulk carriers of 15 years of age or less, BRS may agree to a bottom in-water survey according to Section 3, 3.1.7.

5.3.1.3 In case of ships exceeding 10 years of age the intermediate survey is to be enhanced to the scope of the preceding Class Renewal Survey according to 5.1.6 and 5.4. Pressure testing of ballast and cargo tanks is not required unless deemed necessary by the Surveyor.

5.3.2 Cargo holds

5.3.2.1 Vessels over 5 and up to 10 years of age

5.3.2.1.1 The survey shall include:

- an overall survey of all cargo holds of sufficient extent to establish the general condition of the structure
- **Close-up** survey of a least 25% of shell frames including their end attachments and adjacent shell plating, over the entire height, in the forward cargo hold and one other selected cargo hold
- **Close-up** survey of the transverse bulkheads in the cargo holds mentioned above
- **Close-up** survey of suspect areas¹² identified by the previous class renewal survey
- Regarding coating see 5.2.3.4 above.

5.3.2.1.2 Where considered necessary by the surveyor as a result of the overall and close-up survey as described in 5.3.2.1.1, the survey is to be extended to include a **close-up** survey of all of the shell frames and adjacent shell plating of that cargo hold, as well as a **close-up** survey of sufficient extent of all remaining cargo holds.

5.3.2.2 Vessels over 10 and up to 15 years of age**5.3.2.2.1** The survey is to include:

- an overall survey of all cargo holds of sufficient extent to establish the general condition of the structure
- **Close-up** survey of at least 25% of frames, including their upper and lower end attachments and adjacent shell plating, and of the transverse bulkheads, to the extent deemed necessary, in all cargo holds.
- **Close-up** survey of suspect areas¹² identified by the previous class renewal survey
- For coating see 5.2.3.4 above.

5.3.2.2.2 Where considered necessary by the Surveyor as a result of the surveys listed under 5.3.2.2.1, the intermediate survey is to be extended to include a close-up survey of all shell frames and adjacent shell plating in all cargo holds.

5.3.2.3 Vessels of 15 years of age and over

The survey is to include:

- an overall survey of all cargo holds of sufficient extent to establish the general condition of the structure
- **Close-up** survey of all frames, including their upper and lower end attachments, adjacent shell plating and transverse bulkheads, in all cargo holds.
- **Close-up** survey of suspect areas¹² identified by the previous class renewal survey
- For coating see 5.2.3.4 above.

¹² Suspect areas: Locations showing Substantial Corrosion and/ or considered by the Surveyor to be prone to rapid wastage.

5.3.3 Ballast tanks**5.3.3.1 Vessels over 5 and up to 10 years of age:**

For spaces used for sea water ballast, an overall survey of representative spaces selected by the Surveyor is to be carried out.

Where the coating is found to be in poor condition³, where corrosion or other defects are found in sea water ballast spaces or where a protective coating was not applied from the time of construction, the examination is to be extended to other ballast spaces of the same type. See Section 3, 3.1.2.2.1.

5.3.3.2 Vessels more than 10 years of age

5.3.3.2.1 All sea water ballast tanks are to be examined. If such inspections reveal no visible structural defects, the examination may be limited to verifying whether the protective coating continues to be effective.

5.3.3.2.2 In sea water ballast spaces other than double bottom tanks, where a protective coating is found in poor condition and it is not renewed, where "soft coating" has been applied or where a protective coating was not applied from the time of construction, maintenance of class is to be subject to the tanks in question being examined and thickness measurements carried out as considered necessary, at annual intervals.

When such defects are found in sea water ballast double bottom tanks, maintenance of class may be subject to the tanks in question being examined at annual intervals. See Section 3, 3.1.2.2.2.

Regarding the renewal of coating see also Section 3, 3.1.2.2.3

5.3.3.2.3 In addition to the requirements above, areas found suspect (substantial corrosion, deformations) at the previous class renewal survey are to be subjected to overall and close-up survey.

5.3.3.2.4 For double skin bulk carriers see Table 4.10.

5.3.4 Extent of thickness measurements

5.3.4.1 Thickness measurements are to be carried out to an extent sufficient to determine both general and local corrosion levels in areas subject to close-up survey, as described in 5.3.2 and 5.3.3.2.2/3.

As a minimum, thickness measurements are to be carried out in areas defined as suspect at the previous class renewal survey.

Where substantial corrosion is found, the extent of thickness measurements shall be increased.

5.3.4.2 The thickness measurements may be dispensed with provided the Surveyor is satisfied by the close-up survey that there is no structural diminution and the protective coating where fitted remains effective.

5.3.4.3 For double skin bulk carriers see Table 4.10.

5.4 Class Renewal Surveys**5.4.1 General requirements, scope**

5.4.1.1 In order to ensure that the hull and related piping are in satisfactory condition and fit for the new period of class, the following surveys are to be carried out, in addition to the annual

and intermediate surveys outlined in 5.2 and 5.3, and the surveys prescribed in Section 3, 3.1.3-1.5 for all types of ships.

5.4.1.2 Regarding planning/survey programme, see 5.1.6. Regarding anticipated thickness measurements, see also Section 3, 3.2.3.5.

5.4.1.3 For class renewal surveys of bulk carriers (hull), the "Continuous Class Renewal" procedure described in Sect. 3, 2.1.3.6 is excluded.

5.4.1.4 Drydocking: See Section 3, 3.1.3.1.3

Table 4.8 Class Renewal Surveys of Ships Skin Bulk Carriers (Hull)
Minimum 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
25% of shell frames in the forward cargo hold at representative positions. Selected frames in remaining cargo holds.	All shell frames in the forward cargo hold and 25% of shell frames in each of the remaining cargo holds, including upper and Lower end attachments and adjacent shell plating. For cape Size Bulk Carriers: All shell frames in the forward cargo hold and 50% of shell frames in each of the remaining cargo holds, including upper and lower end attachments and adjacent shell plating.	All shell frames in the forward and one other selected cargo hold and 50% of frames in each of the remaining cargo holds, including upper and lower end attachments and adjacent shell plating.	All shell frames in all cargo holds, including upper and lower end attachments and adjacent shell plating.
One transverse web with associated plating and longitudinals in two representative water ballast tanks of each type	One transverse web with associated plating and longitudinals in each water ballast tank.	All transverse webs with associated plating and longitudinals in each water ballast tank.	Other items: As for Class Renewal Survey No. III
Two selected cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted. ¹	Forward and aft transverse bulkhead in one side shell ballast tank, including stiffening system.	All transverse bulkheads in ballast tanks including stiffening system.	
	All cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted. ¹		
All cargo hold hatch covers and coamings (plating and stiffeners).			
	All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches.		
¹ For bulk carriers as per Section 4, 5.1.7. one of these bulkheads has to be the aft transverse bulkhead of the foremost cargo hold.			

Table 4.9 Class Renewal Surveys of Single Skin and Double Skin Bulk Carriers (Hull) Minimum 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
Suspect Areas			
	Within the cargo length area: - two transverse sections of deck plating outside line of cargo hatch openings	Within the cargo length area: - each deck plate outside line of cargo hatch openings - 2 transverse sections, one in amidship area, outside line of cargo hatch openings	Within the cargo length area: - each deck plate outside line of cargo hatch openings - 3 transverse sections, one in amidship area, outside line of cargo hatch openings - each bottom plate
	Wind and water strakes in way of the transverse sections indicated above	All wind and water strakes within the cargo length area	All wind and water strakes full length
	Selected wind and water strakes outside the cargo length area		Other items: As for Class Renewal Survey No. III
	Measurement, for general assessment and recording of corrosion pattern, of the structural members subject to close-up survey according to Table 4.8 or 4.11		
	Selected cargo hold hatch covers and coamings (plating and stiffeners)	All cargo hold hatch covers and coamings (plating and stiffeners)	
	Selected areas of deck plating inside line of openings between cargo hold hatches	All deck plating inside line of openings between cargo hold hatches	
		Additional measurements of the aft bulkhead of cargo hold No. 1 for ships as per 1.7.1 and 1.7.2	
	Additional measurements of side shell frames and brackets for ships as per 5.1.7.6.		

Table 4.10 Intermediate Survey of Double Skin Bulk Carriers (Hull) Minimum Requirements of Overall Close-up Surveys

Ships age [years]		
5 < age < 10	10 < age < 15	age >15
Overall survey of representative ballast tanks selected by the attending surveyor (the selection is to include fore and aft peak tanks and number of other tanks ,taking into account the total number and type of ballast tanks)	The requirements of the previous Class Renewal Survey	The requirements of the previous Class Renewal Survey
Overall and close-up survey of suspect areas identified at previous (intermediate or Class Renewal) surveys		
Overall survey of all cargo holds		
Thickness measurements to an extent sufficient to determine both general and local corrosion levels at areas subject to close-up survey at suspect areas indentified at previous surveys		

Table 4.11 Class Renewal Surveys of Double Skin Bulk Carriers (Hull)
Minimum 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
One transverse web with associated plating and longitudinals in two representative ballast tanks of each type (This is to include the foremost top-side and double side ballast tanks on either side.) ¹	One transverse web with associated plating and longitudinals as applicable in each ballast tank ¹	All transverse webs with associated plating and longitudinals as applicable in each ballast tank ¹	
	Forward and aft transverse bulkheads including stiffening system in a transverse section including topside ,hopper side and double side ballast tanks ¹	All transverse bulkheads including stiffening system in each ballast tank ¹	
	25 % of ordinary transverse web frames ,in the foremost double side tanks ²	25 % of ordinary transverse web frames in all double side tanks ²	All ordinary transverse web frames in all double side tanks ²
			Areas ³⁻⁵ as for Class Renewal Survey No. III
Two selected cargo hold transverse bulkheads ,including internal structure of upper and lower stools ,where fitted ³	One transverse bulkhead in each cargo hold, including internal structure of upper and lower stools ,where fitted ³	All cargo hold transverse bulkheads ,including internal structure of upper and lower stools ,where fitted ³	

All cargo hold hatch covers and coamings (platings and stiffeners) ⁴	
	All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches ⁵
¹⁻⁵ Are areas to be subjected to close-up surveys and thickness measurements ¹ Transverse web frame or watertight transverse bulkhead in topside ,hopper side and double side and double bottom ballast tanks. In fore and aft peak tanks transverse web frame means a complete transverse web frame ring including adjacent structural members. ² Ordinary transverse frame in double side tanks ³ Cargo hold transverse bulkheads plating ,stiffeners and girders ⁴ Cargo hold hatch covers and coamings ⁵ Deck plating inside line of hatch openings between cargo hold hatches Note Close-up survey of transverse bulkheads to be carried out at four levels: - immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without lower stool - immediately above and below the lower stool shelf plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates - about mid-height of the bulkhead immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools ,or immediately below the topside tanks	

5.4.2 Hull, general

5.4.2.1 All cargo holds, sea water ballast tanks including double bottom tanks, pipe tunnels, cofferdams and void spaces bounding cargo holds, decks and outer hull are to be examined. This examination is to be supplemented by thickness measurements and tank testing as deemed necessary to ensure that the structural integrity continues to be given.

The examination is to be sufficiently thorough for revealing substantial corrosion, significant deformations, fractures, damages or other structural deteriorations.

For coating see 5.2.3.4 above.

5.4.2.2 All piping systems within the above spaces are to be examined and tested under working conditions to ensure their continued satisfactory condition.

5.4.2.3 The survey extent of combined ballast/cargo holds is to be evaluated based on the records of ballast history, the kind and extent of corrosion protection system provided, and the extent of corrosion found.

5.4.2.4 The survey extent of ballast tanks converted into void spaces will be specially considered in relation to the requirements for ballast tanks.

5.4.2.5 Extent of close-up surveys and thickness measurements: see 5.4.3, 5.4.4 and 5.4.5 below.

5.4.3 Hatch covers, coamings

The survey of hatch covers and coamings shall include the following:

- a thorough inspection of the items listed in 5.2.2
- checking of the satisfactory operation of mechanically operated hatch covers, including:
 - stowage and securing in open condition;

- condition of sealing, proper fit in closed condition;
- operational testing of hydraulic and power components (wires, chains, and link drives)
- checking of the effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent
- thickness measurement of the hatch cover and coaming plating and stiffeners as given in Table 4.9

5.4.4 Cargo holds, ballast tanks

5.4.4.1 An overall survey of all tanks and spaces (excluding fuel oil, lubricating oil and fresh water tanks) is to be carried out.

For fuel oil, lubricating oil and fresh water tanks the necessity for an overall survey is to be determined based on the ship's age, see also Table 3.1.

5.4.4.2 The class renewal survey is to include a **close-up examination** of sufficient extent to

establish the condition of the shell frames and their lower and upper end attachments in all cargo holds and of the stiffening structures in sea water ballast tanks as indicated in Table 4.8 and Table 4.11.

5.4.4.3 Tank protection: The condition of coating or corrosion protection of ballast tanks, where provided, is to be examined. The statements under 5.3.3.2.2 and 5.3.3.2.3 apply to class renewal surveys of bulk carriers, regardless of age.

5.4.5 Thickness measurements

5.4.5.1 The minimum requirements for thickness measurements on the occasion of class renewal surveys are stated in Table 4.9, depending on the ship's age.

Representative thickness measurements to determine both general and local levels of corrosion in the shell frames and their end attachments in all cargo holds, of the stiffening structure in sea water ballast tanks and on the transverse bulkhead plating are to be carried out.

5.4.5.2 The extent of thickness measurements may be reduced, in comparison with those stated in Table 4.9, 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.

5.4.5.3 The Surveyor may extend the thickness measurement as deemed necessary. This applies especially to areas with substantial corrosion and to areas defined as suspect in the inspection programme (see 5.1.6). The thickness measurements should be witnessed by the Surveyor to the necessary extent.

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

5.4.5.5 Regarding thickness measurements, see also Section 3, 3.2. For bulk carriers designed also for the carriage of crude oil, see also 1.4.2.3.4.

5.4.6 Tank testing

5.4.6.1 All boundaries of sea water ballast tanks and deep tanks within the cargo hold area, and of cargo holds used for sea water ballast, are to be pressure-tested by filling with water.

5.4.6.2 Representative fuel oil, lubricating oil and fresh water tanks as selected by the Surveyor are to be tested. The tightness of fuel oil, lubricating oil and fresh water tanks may be confirmed by filling with oil, water or air pressure test. The air pressure must not exceed 0.2 bar gauge pressure.

5.4.6.3 The pressure should correspond to a water level to the top of hatches for ballast/cargo holds or to the top of air pipes for ballast tanks or fuel oil, lubricating oil or fresh water tanks, whichever pressure is higher. See also Section 3, 3.1.3.2.1.4.

6. FISHING VESSELS

The Rules for Classification and Surveys of Fishing Vessels are contained in Part A of the Construction Rules. See Rules for Classification and Construction, Part 1 - Seagoing Ships, Chapter 8.

7. INLAND VESSELS

7.1 General requirements

7.1.1 The following regulations relate to inland vessels as defined in the BRS Construction Rules (Part 2); see also Section 2, 3.3.1.1.2 of the present Classification Rules.

7.1.2 Unless otherwise stated in the following, the regulations in Section 3 (in particular 3, 1. and 3, 3.) apply, as far as of relevance for inland vessels.

7.1.3 In the case of inland vessels annual surveys are required for steam boilers only (see 7.3.3.7).

7.1.4 As a matter of principle, the class period for hull and machinery is identical. However, surveys and inspections performed in accordance with items 7.3 and 7.4 respectively may be recognized for the class renewal, even if conducted more than 15 months before the date of expiry of the class.

7.1.5 Records on the periodical inspections of steam boilers, thermal oil heaters, pressure vessels and piping systems are entered into special inspection certificates to be kept on board.

7.2 Intermediate surveys

7.2.1 General

Intermediate surveys will be carried out normally every 2.5 years, but not later than 3 years, after commissioning and each class renewal.

The survey may be effected with the ship afloat (however, cf. 7.2.4) and will in general cover an external check of the main hull elements and of all components which are of significance for the vessel's safety such as the steering gear, the machinery, including the electrical installation, and pressure vessels with their safety devices.

7.2.2 Machinery installations, general

7.2.2.1 The following items are to be checked:

- main and auxiliary machinery, with accessories
- electrical machinery and pertinent switch gear, including cables.

7.2.2.2 The automation equipment is to be checked in accordance with the programme fixed by BRS (AUT 4).

7.2.2.3 For internal surveys of steam boilers, see 7.3.4.7.

7.2.2.4 Steering gear

The steering gear is to be function-tested.

7.2.3 Machinery installations, safety systems (tankers)

On tankers the following installations and equipment are to be checked:

- electrical equipment, in particular electrical installations in areas of explosion hazard, in which ignitable gas mixtures or water vapours may accumulate
- level/overflow alarms
- level indicators
- tank venting systems
- flame arresters
- pipings, valves and fittings, pumps
- pump room equipment, including ventilation system
- fire-extinguishing equipment.

7.2.4 Drydocking

Intermediate surveys have to be carried out in drydock

- if the vessel's shell is riveted,
- if the vessel's age exceeds 20 years and if required by the Surveyor.

7.3 Class renewal surveys**7.3.1 Hull, general**

7.3.1.1 The class renewal survey will be held while the ship is in drydock or on the slipway. The ship has to be placed on blocks of sufficient height so as to allow the keel, bottom plating, rudder, propeller and propeller shaft to be inspected.

7.3.1.2 The survey will cover all structural elements of the ship and all component

parts essential for her operation and safety, such as steering gear, watertight doors, hatchways, capstans and windlasses, anchors, cables and hawsers, as well as fire protection installations.

7.3.1.3 In order to render possible inspection of all inner structural elements, such as frames, floor plates, stringers, shell plating, decks, deck beams, bulkheads, ceiling, inner bottom, the cargo holds and all cargo tanks are to be emptied and cleaned and - where necessary - freed of gas. Service tanks (fuel, lubricating-oil and fresh-water tanks) need not be emptied if their tightness, while completely filled, is proved by means of an external inspection.

7.3.1.4 If there is good reason, the Surveyor may require the rust to be removed from selected areas of the ship's structure and have the thickness of the shell plating, of the built-in tanks, the walls of which do not form part of the shell plating, of the decks and bulkheads measured by the recognized test methods (e.g. ultrasonic measurements). Defective coverings (e.g. cement and asphalt) must be removed in accordance with the Surveyor's instructions. Prior to renewing paintwork or coverings, the ship's steelwork concerned is to be inspected.

7.3.1.5 On the occasion of each survey, at least one bottom ceiling strake on either side of the centre keelson and one strake each of the bottom and bilge ceiling at the ship's side will have to be removed in each compartment over their entire length in order to allow the inner surface of the bottom plates to be inspected. At every third survey, at least one third of the ceiling will have to be removed at the Surveyor's discretion.

7.3.2 Hull, tankers

7.3.2.1 On tankers which - as can be proved - have exclusively carried cargo not causing corrosion, the cargo tanks shall be inspected at every other class renewal only, provided that it may be assumed on the basis of random checks that the component parts are still in satisfactory condition, and provided that no objections will result from the pressure tests as per 7.3.2.2.

7.3.2.2 During each class renewal, the cofferdams of tankers are to be hydrostatically tested to the test pressure as defined in Chapter 1 of the Construction Rules for steel Inland Waterway Vessels.

At every other class renewal, the cargo tanks of tankers are to be tested by water and/or air pressure, to the test pressure stated in the Rules. Where substances are carried which cause corrosion in connection with water, the kind of testing is to be specified.

7.3.2.3 At every class renewal, tanks of tankers carrying acids and lyes will be subjected to an internal examination and, at every other class renewal, to a hydrostatic pressure test. The test pressure to be fixed in accordance with the Construction Rules depends on the density of the cargo.

7.3.2.4 Tanks for the carriage of pressurized liquefied gases are to be tested like pressure vessels. Deviating therefrom, cargo tanks need to be subjected to an internal inspection on the occasion of every other class renewal only, if in these tanks only gases or gas mixtures have been carried, which have no corrosive effect upon their walls, and if random checks suggest that the tanks are in satisfactory condition.

7.3.3 Tankers, piping systems

Cargo pipings, including valves and fittings, pumps as well as gas-freeing and safety equipment are to be surveyed.

At each class renewal, the loading and discharge pipes of tankers are to be tested to 1.2 times the allowable working pressure.

7.3.4 Machinery

7.3.4.1 The class renewal survey includes the surveys and checks mentioned in 7.2.

7.3.4.2 The main and auxiliary machinery, including the electric generators, may also be inspected on the occasion of overhaul work of the machinery plant. The survey dates will be fixed by BRS, taking into account the intervals between repairs as recommended by the engine manufacturers.

Where, owing to service periods, intervals between repairs of main propulsion engines exceed a period of class, an inspection is to be provided for, permitting the condition of engine components subject to wear to be assessed. The inspection will also cover the couplings, gears and adjacent shafts and bearings.

7.3.4.3 Electrical installations

7.3.4.3.1 The electrical installation in the engine room, in the compartments and on deck will be checked, including cables, wires, distributors, etc. The windings of the electric generators and motors for essential auxiliary machinery will be checked for their condition, as will be parts subject to wear, such as collectors, slip rings and carbon brushes.

7.3.4.3.2 On tankers, the electrical installations and equipment are to be checked for compliance with the relevant explosion protection requirements.

7.3.4.4 The automation equipment is to be checked in accordance with the programme fixed by BRS (AUT 4). Cf. Section 3, 3.1.5.6.

7.3.4.5 All pressure vessels will be surveyed internally and externally during each class renewal¹³. For pressure vessels, which cannot be properly inspected internally or the condition of which cannot be ascertained during the internal inspection, either a nondestructive testing method is to be applied or an additional hydrostatic test is to be performed.

The hydrostatic test will be conducted to 1.5 times the maximum allowable working pressure. Pressure tanks according to DIN 4810 are to be tested to a test pressure of 5.2 and 7.8 bar respectively, depending on their pressure stage, i.e. 4 or 6 bar. In no case must the test pressure exceed the initial test pressure.

7.3.4.6 Supply steam pipings and cargo heating equipment, such as steam heating coils in oil bunkers/ vessels and cargo tanks will be surveyed and subjected to a hydrostatic test to 1.5 times the maximum allowable working pressure. Random checks of the inner condition of the pipings, in particular of the pipe bends, may likewise be demanded, or additional examinations may be required.

7.3.4.7 Boiler installations

For inspections of steam boilers, see Section 3, 2.1.5.2 and 3.1.5.2.

External inspections are to be carried out annually and internal inspections on the occasion of each intermediate survey and class renewal.

7.3.4.8 Thermal oil plants

Thermal oil plants are to be subjected to periodical surveys.

External inspections are to be performed on the occasion of each intermediate and class renewal survey. Proof of continued usability of the thermal oil shall be furnished annually by a competent

¹³ Regulations of national authorities may have to be observed.

testing institution.

Internal inspections, including a tightness test of the whole plant, are to be performed at intervals of 5 years, counting from the commencement of initial operation and possibility in connection with a class renewal survey.

For extent of survey see Section 3, 3.1.5.3.

7.4 Periodical surveys of propeller and tube shafts

7.4.1 Survey intervals

7.4.1.1 Propeller and tube shafts are to be drawn for inspection at intervals of 5 years (SW). For exception, see 7.4.1.2.

7.4.1.2 Propeller and tube shafts:

- mechanically grease-lubricated or
- with oil sealing glands and oil-lubricated bearings or
- made of corrosion-resistant material

may be subjected to a modified survey (SWM) at intervals of 5 years, unless the survey results require drawing of the shafts.

7.4.1.3 Omnidirectional propellers for main propulsion purposes are subject to the same survey intervals as propeller and tube shafts.

7.4.1.4 Within the scope of complete or modified surveys of the propeller shaft, the remote and local control gear of controllable-pitch propellers is to be surveyed at the Surveyor's discretion.

7.4.1.5 The aforementioned surveys may be carried out with a time window of ± 6 months, independent of the other surveys for class renewal (see 7.1.4).

7.4.2 Scope of surveys

7.4.2.1 Survey of the drawn shaft (SW)

As far as applicable, the survey of the drawn shaft covers:

- the shaft in its entirety, especially the cone, the keyway and thread, or the fillet of the flange
- checking for true running
- non-destructive examination of the aft part of the shaft by approved crack detection methods
- examination of the oil sealing glands and the chrome steel liner
- examination of the contact surfaces and liners of the shaft
- examination of the stern tube bearing

- examination of the propeller (fit and general condition)
- examination of the bearing clearances before and after the survey.

The gearing and control elements of omnidirectional propellers for main propulsion purposes are to be exposed for the survey.

7.4.2.2 Modified Survey (SWM)

As far as applicable, the scope of the modified survey covers:

- all accessible parts of the shaft, including the propeller connection to the shaft
- checking for true running
- the propeller
- checking of the oil sealing glands
- measurement of the clearances of the stern tube bearings
- non-destructive examination of the aft part of the shaft by approved crack detection methods.

The modified survey (SWM) also applies to omnidirectional propellers as per 7.4.2.1, if their gearing and control elements can be surveyed through inspection openings.

7.5 Class extension surveys

7.5.1 On owners' special application, following surveys of hull and machinery afloat, BRS may within two periods of class, extend the class by no more than 12 months in total, provided that the surveys show that hull and machinery are in unobjectionable condition.

In that case, the last survey in drydock must not date back more than 5 years, counting from the date of the respective class renewal survey.

With ships of over 20 years of age or the hull structural elements of which are riveted, the last survey in drydock must not date back more than 3 years.

7.6 Damage and repair surveys

Every damage affecting the safety of the ship or her machinery or endangering her cargo must be reported to BRS and be inspected by a Surveyor prior to commencement of repair work.

See also Sections 2.2. and 3, 1.1.2 and 2.2.1.

7.7 Conversion and modification surveys

All conversions and modifications of component parts covered by the Society's Construction Rules must be carried out under the Society's supervision. Conversion drawings will have to be submitted to the Society and approved prior to commencement of work.

Hull and machinery components and parts of the equipment may have to be replaced if, subject to the Society's Rules, they are inadequate in dimensions and size for the converted or modified ship. The Society may, however, grant exemptions (cf. Sections 2, 2 and 3.1)

8. FLOATING DOCKS**8.1 General**

8.1.1 For floating docks subject to classification by BRS, unless otherwise agreed, class renewal surveys are to be conducted at intervals of 5 years.

8.1.2 Floating docks which are not classified may on application be subjected to a condition survey, e.g. prior to sale or conversion.

8.1.3 If classification is intended, the procedure to be followed regarding documents to be submitted and the scope of surveys for classification is analogous to that outlined in Section 2.5. Structural plans of the essential structural elements of the dock structure and particulars on their machinery and equipment are to be submitted for approval.

8.2 Class renewal surveys**8.2.1 Dock structure**

8.2.1.1 For class renewal, the dock structure should be immersed as little as possible; the structural elements above the waterline will be inspected both, internally and externally, and the watertight compartments internally, at the Surveyor's discretion. Particular attention is to be paid to the pipings arranged inside the compartments, including their valves; these, as well as the inlet and outlet valves, are to be checked for tightness and operability.

8.2.1.2 The partition bulkheads of the watertight compartments are to be checked for tightness and tested by compressed air (max. 0.2 bar). The compartments to be tested will be selected by the Surveyor, depending on the age and general condition of the dock; however, at least every other compartment is to be tested.

8.2.1.3 If only every other compartment is pressure-tested, on the occasion of a trial docking also the tightness of the safety deck is to be tested.

8.2.1.4 Thickness measurements at parts of the dock structure are to be carried out on the occasion of every other class renewal, and/or the Surveyor may require them to be carried out, if he suspects an inadmissible degree of corrosion.

8.2.1.5 Drydockings or bottom surveys with the dock in inclined position will be confined to particular cases (averages, leakages, etc.) upon agreement between owners/operators and BRS.

8.2.2 Machinery equipment

The machinery equipment for operation of the dock, including the electrical equipment, is to be surveyed and checked analogously to the procedure outlined in Sections 3, 3.1.3.3 and 3.1.5, as far as applicable.

8.2.3 Equipment

The equipment required for operation of the dock, e.g. bilge and keel blocks and - if fitted - their drives, warping capstans, cranes, bridge connections, shore connections and the dock

mooring equipment are to be covered by the condition survey. Changes introduced since the last class renewal are to be documented.

8.3 Annual Surveys to determined General condition of Hull and Machinery.

9. YACHTS AND SMALL WATERCRAFT

9.1 General remarks. Kinds of surveys

9.1.1 Regarding the surveys necessary for maintenance of class, on principle, the requirements of Section 3, and in particular, of 3.1, apply.

The following kinds of surveys are prescribed for watercraft as defined in Section 2, 6.

9.1.2 For sporting craft with total engine outputs exceeding 300 kW, and for watercraft employed for commercial purposes and/or by authorities: **Intermediate surveys** of the hull, the machinery installation including the electrical installation, the rigging and the closures, according to 7.2.1.

The intermediate survey is due 2,5 years after assignment or renewal of class, with a time window of $\pm$ 6 months being allowed.

9.1.3 For all types of watercraft: **Class renewal surveys** according to 9.2.2, 5 years after assignment of class or last class renewal. The time window is as for seagoing ships, see 2.1.3 (i.e. the survey may be started 15 months before, and must be finished at the date of expiry of the class period).

9.1.4 **Damage surveys** are required if the hull, machinery, electrical installation or rigging have suffered a damage, if a damage is suspected in consequence of some other event, or if deteriorations affecting the vessel's class have been ascertained.

9.1.5 For bottom surveys (drydocking or placing onshore), see also Section 3, 2.1.6.7.

9.1.6 Other surveys

9.1.6.1 Upon special agreement, BRS may undertake condition surveys and supervise repairs of watercraft constructed under the Society's supervision.

The surveys and findings will be certified informally.

9.1.6.2 Expertises are prepared only by order of a court and provided that BRS's principle of impartiality is not affected.

9.1.6.3 Where surveys are required by official directives or similar provisions of an Administration, BRS will perform these on application and/or on behalf of the authorities, in accordance with their instructions.

9.2 Performance and scope of surveys

9.2.1 Intermediate surveys

The survey is to be conducted on shore. To this effect, the vessel is to be stacked at a height enabling its keel and bottom to be thoroughly examined.

The surveys/inspections will have to cover:

- the hull structural areas, including the foundations

- masts and rigging, including fastening devices for eye plates
- watertight closures, such as hatches, skylights, air and sounding pipes, scuppers, discharge lines, doors, etc., including their sealings and locking devices.
- rudder and steering gear, including measurement of bearing clearances
- main and auxiliary machinery with pertinent components
- electrical installation, including pertinent machinery, switchboards and cabling
- propeller, including fastening/securing devices
- external inspection of the entire propeller shaft system(s) in place, including measurement of bearing clearances
- sea valves and all inlet and outlet shell openings.

9.2.2 Class renewal surveys

The class renewal survey is to be carried out on shore. To this effect, the vessel is to be stacked at a height enabling its keel and bottom to be thoroughly examined. In addition to the surveys required in 9.2.1 above, the surveys/inspections will have to include:

- internal inspection of fresh water, ballast and fuel tanks
- pressure tests of tanks carrying water
- hose testing of all watertight closures
- inspection of anchors, chain cables, hawses
- inspection of bilge and ballast lines, including pertinent pumps, with operational trials
- unmounting of sea valves in the light of findings obtained during external inspection, in accordance with the Surveyor's instructions
- drawing of propeller shaft in accordance with the Surveyor's instructions, where necessary in view of findings obtained by external inspection
- unmounting of individual components of the machinery in accordance with the Surveyor's instructions, where required on account of this findings
- partial or complete disassembly of main engines (with a total output, exceeding 300 kW), in accordance with the Surveyor's instructions, taking into account provable service times between overhauls and maintenance work performed.
- operational trials of the entire machinery and electrical installation, with the ship afloat.

9.3 Thickness measurements and Corrosion/ Wear tolerances

9.3.1 In the case of aged steel ships thickness measurements are to be conducted at

the hull structural elements in accordance with the Surveyor's instructions. The scope of measurements depends on the vessel's age and maintenance condition.

9.3.2 Parts damaged or worn to such an extent as to no longer comply with the requirements of BRS are to be repaired or replaced.

9.3.3 Components with thicknesses of less than 90% of those stipulated are to be renewed.

9.3.4 Anchors are to be replaced, if their weights have been reduced by more than 10% compared with the rule weight.

Chain-link cables are to be renewed, if the prescribed cross-section of the chain links has been reduced by more than 12 %. See also Section 3.2.4.4.

10. SUBMERSIBLES

Regarding the required surveys for maintenance of the class see the Rules.