Rules for the classification and construction of sea-going vessels

Part 1 – Classification Regulations and Surveys

Chapter 1 – General

01/07/2018
Revision: 1

Revision History

Revision no.	Effective Date	Revision Summary
1	01/07/2018	The revision of this Part is based on: ▪ IACS Unified Requirements: UR Z17 (June 2015), ▪ IACS Procedural Requirements: PR1C (January 2016) and PR1A (January 2016). Editorial changes have been carried out.
Initial	01/01/2015	Initial issue

Table of content

Section 1 – General information 5
1.1 Dromon Bureau of Shipping (DBS) 5
1.2 Definitions 5
1.3 Fees 6
1.4 Customers responsibility 6
1.5 Submission of Plans 7
1.6 Change of owner or manager 8
1.7 Confidentiality 8
1.8 Appeals 8
1.9 Audits and monitoring 8
1.10 Recommendations 8
1.11 Responding to Port State Control 8
1.12 Force Majeure 8
1.13 Liability 9
1.14 Jurisdiction 9
Section 2 – Classification Regulations 10
2.1 General 10
2.2 Definitions 10
2.3 Application of rules 12
2.4 Scope of classification 12
2.5 Class Characters and Notations 12
2.6 Materials 16
2.7 Date of contract for construction 16
2.8 Date of build 16
2.9 Certificates 16
2.10 Repairs and alterations 18
2.11 Suspension and reinstatement of class in the case of overdue surveys 18
2.12 Suspension and reinstatement of class in the case of overdue recommendations / conditions of class 19
2.13 Suspension and reinstatement of class of dual classed vessels 20
2.14 Suspension and reinstatement of class for other reasons 20
2.15 Withdrawal of class 20
2.16 Notification and Reporting 21
2.17 Deletion of class 21
2.18 Reclassification 21
2.19 Survey Reports 21
Section 3 – Requirements for service providers 22
3.1 General 22
3.2 Definitions 22
3.3 Application 22
3.4 Procedure for Approval and Certification 23
3.4.1 Submission of documents 23
3.4.2 General requirements: 24

3.4.2 Auditing of the Supplier 25
3.4.3 Certification 25
3.4.4 Quality System 25
3.4.5 Service Suppliers Relations with the Equipment Manufacturer 25
3.4 Certification 25
3.6 Information Regarding Alterations to the Certified Service Operating System 26
3.7 Cancellation of Approval 26
3.8 Existing Approvals 26
Section 4 – Type approval programme 29
4.1 General 29
4.2 Limitations 29
4.3 Process 29
Section 5 – Procedure for Transfer of Class 35
5.1 General 35
5.2 Definitions 35
5.3 Obligations and reporting of DBS 35
5.4 Transfer of class at vessel's delivery 37
5.5 Technical requirements 38
5.6 Plans to be submitted by the Owner to the Gaining Society 39

Section 1 – General information

1.1 Dromon Bureau of Shipping (DBS)

1.1.1 Dromon Bureau of Shipping (abbreviated as DBS) is an independent engineering service provider established in 2003 with the objective of protecting the environment and life at sea. DBS core services include classification of ships and other marine structures, statutory certification services on behalf of various Flag States and verification of environmental parameters under various schemes.

1.1.2 DBS policy is to provide controlled and continually improving quality services to the maritime industry in support of its mission, based on unbiased personal service to each client and being responsive to their individual requirements.

1.1.3 DBS maintains a management system assessed and certified against the ISO 9001 for quality management, ISO 17020 as an inspection body, ISO 14065 as a greenhouse gas validation and verification body and OHSAS 18001 for occupational health and safety management.

1.2 Definitions

Audit	a systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve the stated objectives
Audit Checklist	a listing of specific items within a given area that are to be audited
Audit Report/ Checklist	a combination of audit report and associated checklist
Board	the Board of Directors of DBS as mentioned in the Articles of Association
Builder	the party contracted to build a vessel in accordance with DBS Regulations
Technical Committee	the Technical Committee of DBS as defined within the Quality System Manual
Council	the Council of DBS as defined within the Quality System Manual
Component	parts/ members of a product or system formed from material
Customer	refers to any person and/or legal entity who has requested a service and is accountable for payment of DBS fees
Finding	a statement of fact supported by objective evidence about a process whose performance characteristics meet the definition of non-conformance or observation
Flag State	the maritime administration of a vessel's country of registry.
General Audit	an audit that addresses the general operation of a site, and addresses applicable sections of the Quality and Environmental System manual, procedures and operating procedures and process instructions
Manufacturing Process	the steps that one takes to produce (manufacture) a product
Manufacturing System	The system is bigger than the manufacturing process, since it considers all of the factors that affect the process. This include control of the process inputs, process controlling factors (such as competency of personnel, procedures, facilities and equipment, training, etc.) process outputs and measurements of quality, process and product for continual improvement, etc.0
Material	goods used that will require further forming or manufacturing before becoming a new component or product
Non-conformance	non-fulfillment of a specified requirement
Observation	a detected weakness that, if not corrected, may result in the degradation of product or service quality or potential negative impact on the environment
Original Equipment Manufacturer (OEM)	the person or legal entity that has the legal or patent rights to produce the material, component, product or system.

Port State Authority	the maritime authority in the country of the vessel's port of call
Product	result of the manufacturing process
Production Testing	is the destructive and nondestructive testing of the materials and components used in the manufacture of a product and its final testing that is recorded in Unit Certification
Prototype Testing	is the destructive and nondestructive testing of the materials and components presented for evaluation of the original design of a product. If a Surveyor's witness is required, this may not be waived under any Section of the Rules, unless it is done by a recognized third party
Rules	the prescriptive and performance based technical requirements stipulated in the "Rules for the classification and construction of sea-going vessel" of DBS in force or as applicable
Regulations	the classification principles and the survey requirements stipulated in the "Rules for the classification and construction of sea-going vessels" of DBS in force or as applicable
Register of Ships	refers to a register which is maintained by DBS Head Office and contains main characteristics of classification of vessels. The Register of Ships is maintained in electronic format
Recognized Organization	An organization that has been assessed by a flag Administration and found to comply with Part 2 of the Code for Recognized Organizations (RO Code) as per the IMO resolutions MSC.349(92) and MEPC.237(65)
Recognized Third Party	is a member of the International Association of Classification Societies (IACS), a Flag State, a Nationally Certified testing Laboratories and others who may be presented to DBS for special consideration
Surveillance Audit	an audit that addresses specific areas within the operation at a site, and addresses selected sections of the Quality Management System procedures, operating procedures and process instructions
Type Testing	is the destructive and nondestructive testing of the materials and components of the first article of a product manufactured. If a Surveyor's witness is required, this may not be waived under any section of the Rules

1.3 Fees

For all the services provided by DBS, fees will be charged. Additionally, DBS will charge for other expenses incurred in connection with these services and bill both the fees and additional expenses to the customer.

1.4 Customers responsibility

1.4.1 To inform DBS in a timely manner:

1. all information that would be detrimental in the decision by Dromon Council to accept a vessel under classification. This include any pending recommendations or memorandum imposed by the previous Classification Society. The information supplied to DBS shall be authentic and where unauthenticated information is supplied, it is the responsibility of the Customer to qualify the same as such;
2. in case the vessel is laid up or taken out of service;
3. that the vessel will undertake unscheduled dry dock;
4. in case deficiencies have been imposed following a Port State Control or Flag State Control inspections; and
5. if the Automatic Identification System (AIS) of the vessel is inoperative or switched off. The AIS shall remain switched on at all times as required by SOLAS Regulation V/19.

1.4.2 To ensure that the vessel is maintained in accordance with DBS Rules and Standards and handled in a competent manner.

1.4.3 To pay the fees for any requested service.

1.4.4 Rectify any recommendation or memorandum imposed by DBS or its Surveyor.

1.4.5 Ensure that all measuring equipment used for the construction, operation and survey of a vessel is duly calibrated or their accuracy shall be to the satisfaction of the Surveyor.

1.4.6 Maintain records as deemed necessary by the current Rules.

1.4.7 Offer access to the vessel, and any pertinent documentation relevant for the survey at all reasonable times.

1.4.8 Ascertain that all the surveys necessary for the maintenance of class are done at appropriate time and in accordance with the requirements and instructions of DBS.

1.4.9 In case the classification status is withdrawal, submit all original certificates issued by DBS back to the Head Office.

1.5 Submission of Plans

It is the responsibility of the Customer the following plans and documentation required by the Rules to be submitted to DBS. Electronic copies of these plans can be accepted.

1.5.1 Hull Plans

1.5.1.1 Plans showing the scantlings, arrangements, and details of the principal parts of the hull structure of each vessel to be built under survey are to be submitted and approved before the work of construction is commenced. These plans are to indicate clearly the scantlings and details of welding, and they are to include such particulars as the design draft and design speed.

1.5.1.2 Where provision is to be made for any special type of cargo or for any exceptional conditions of loading, whether in ballast or with cargo, information of the weights to be carried and of their distribution are also to be given.

1.5.1.3 In general, the following plans are to be submitted for review or reference:

a. Anchor handling arrangements
b. Bottom construction, floors, girders, etc.
c. Bow framing
d. Capacity plan
e. Damage control plan, as applicable
f. Deck plans
g. Docking plan
h. Framing plan
i. General Arrangement
j. Hatches and hatch-closing arrangements
k. Hull port and framing details
l. Inner bottom plating
m. Lines and body plan
n. Machinery casings, boiler, engine and main auxiliary foundations
o. Midship section
p. Miscellaneous nontight bulkheads which are used as structural supports
q. Pillars and girders
r. Scantling profile and decks
s. Shaft struts
t. Shaft tunnels
u. Shell expansion
v. Skeg attachment foundations, if applicable
w. Spectacle frames and bossing details
x. Stem
y. Stern frame and rudder
z. Stern framing
aa. Superstructures and deckhouses, and their closing arrangements
bb. Ventilation system on weather decks
cc. Vessel Specifications
dd. Watertight and deep-tank bulkheads
ee. Watertight doors and framing
ff. Weathertight doors, framing, and sill heights
gg. Welding Schedule and details
hh. Window and framing details
ii. Arrangement of Cargo handling gear

1.5.2 Machinery plans

1.5.2.1 Plans showing the boilers, main propulsion engines, reduction gears, shafting and thrust bearing foundations including holding-down bolts shall be submitted.

1.5.2.2 Also, machinery general arrangement, installation and equipment plans are to be submitted and approved in advance.

1.5.3 Additional plans

Where certification under International Conventions or Codes is requested, submission of additional plans and calculations may be required.

1.6 Change of owner or manager

1.6.1 The class of a ship is retained when it is transferred to another owner, with the exception of class notations based on certification of management of operations, which will be deleted automatically. However, in case of such transfer, a written notice shall immediately be sent to DBS by the previous owner and until this has been done, communication with binding effect will be sent to the previous owner.

1.7 Confidentiality

1.7.1 Except as stated in paragraphs hereunder, without prior permission from the Customer, DBS will not disclose any plans, documents, data and information which come in to its possession to any third party.

1.7.2 For dually classed vessels, technical particulars of the vessel, information regarding surveys, certificates, recommendations etc. as provided in the agreement with the corresponding society will be exchanged with that society, without seeking permission from the Customer.

1.7.3 Also, information requested by Port States, Flag States, Underwriters, P&I club as well as DBS Accreditation and Certification Bodies with respect to the status of surveys and certificates issued to the vessel, along with the details of outstanding recommendations will be given to such bodies without taking permission of the Customer.

1.7.4 DBS as a data provider to various platforms will provide information with respect to the status of surveys and certificates issued to the vessel, without taking permission of the Customer.

1.8 Appeals

The Customer can appeal to DBS following the appeal procedure that is freely accessed through DBS website.

1.9 Audits and monitoring

1.9.1 Classification surveys and other activities related to the services provided by DBS are subject to audits and monitoring under the quality management system of DBS by internal and external bodies. The Customer shall be responsible to provide all necessary assistance for the facilitation of such internal and external audits.

1.9.2 In case the audits reveal any deficiencies in the services provided in the past requiring any rectification to be carried out by the vessel, the Customer shall be responsible for rectifying such deficiencies.

1.10 Recommendations

1.10.1 Irrespective of the fact that the matter referred to has been approved previously or not and have to be fulfilled within specified time frame, if it is found that rule requirements required for classification are not satisfied, DBS will issue a recommendation for some improvisations, new surveys or other measures found necessary to retain the classification status.

1.10.2 If DBS deems necessary to have technical measurements or other examination carried out to ascertain whether damage has been sustained or is imminent, a recommendation will be issued.

1.10.3 Deficiencies recorded by Port State Control and Fag State Authorities, shall be treated in the same manner as recommendations issued by DBS, as far they are applicable to vessels classification or statutory certificates issued by DBS and shall be dealt with to the satisfaction of DBS.

1.10.4 Recommendations for immediate fulfillment can be made verbally, provided the representative of the owners accepts the Recommendation and the surveyor ensured that the Recommendation has been dealt with before the ship leaves port. Where in the opinion of the society a damage that has been sustained or imminent is not likely to affect the efficient condition of the vessel for an agreed duration then a Notice of Recommendation (NOR) will be issued in writing specifying the date by which the recommendation has to be dealt with.

1.10.5 A Notice of Recommendation (NOR), apart from the request stated above, also constitutes a confirmation by the society that, in the opinion of the society, the ship is considered to remain efficient during the mean time. A NOR will be deleted when by survey or other means the Society has established that the requirements have been fulfilled.

1.11 Responding to Port State Control

When the Port State requests and upon consensus by the vessel's Owner or Master, DBS Surveyors will attend onboard ship to ensure the proper rectification of reported deficiencies or other discrepancies that have adverse effect or may adversely affect classification or statutory certificates issued by DBS. DBS Surveyors will also assist along with Port States by giving relevant background information to inspectors.

1.12 Force Majeure

1.12.1 If the vessel is not in port when surveys become overdue and that due to force majeure, DBS may permit the vessel to sail, in class, directly to an agreed discharge port and then, if required, in ballast to an approved repair facility at which the survey can be properly carried out.

1.12.2 In the aforementioned context, “Force Majeure” means any damage to the vessel, sudden possibility of Surveyors unable to attend the vessel due to governmental restrictions on right of access or movement of personnel, unforeseen delays at ports or inability to discharge cargo due to abnormally lengthy periods of harsh weather, civil strife, strikes, acts of war, acts of God or other force majeure.

1.13 Liability

1.13.1 It is agreed that as provided below, DBS, its subsidiaries, bodies, directors, officers, employees and agents shall have any liability for any loss, damage or expense allegedly caused directly or indirectly by their mistake or negligence, breach of warranty, or any other act, omission or error by them including gross negligence or willful misconduct by any such person with the exception of gross negligence or willful misconduct by the governing bodies or senior executive officers of DBS.

1.13.2 DBS will pay by way of compensation to a person a sum limited to the value of fees paid to DBS only if that person used the services of DBS or its subsidiaries or relies on any decision made or information given by or on behalf of them and in consequence suffers a loss, damage or expense proved to be due to their negligence, omission or default.

1.13.3 Yet, under no circumstance’s hall the individual or individuals who have personally caused the loss, damage or expense be held liable.

1.14 Jurisdiction

1.13.1. This means all bodies under DBS which would include its subsidiaries, directors, office bearers, agents and any other body or member authorized by DBS or acting on behalf of DBS.

1.13.2. Use by other parties
DBS has copyrights of these rules and they fall under its ownership rights. Consequently, only DBS is entitled to offer and/or perform classification or other services on the basis of and/or pursuant to these rules without DBS prior written consent, which can include issuance of certificates and/or declarations of conformity, wholly or partly. Also, DBS cannot be held accountable for the resultant consequences of using rules other than those specified by DBS.

1.13.3. Governing Law
The English law shall govern the relationship between DBS and other parties, these rules are used for the classification of the vessels.

Section 2 – Classification Regulations

2.1 General

2.1.1 The development of independent technical standards for ships and the authentication of compliance with these standards throughout the ship's life are covered under the classification concept. The aim of these Rules is to ascertain safety against dangers posed to the ship, personnel, passengers and cargo, as well as to the dangers posed to the environment because of sea transport. The classification of ships is to be done as per the requirements of the Rules and using other standards to which reference is made. After the class is assigned, DBS issues a Classification Certificate and enters in its Register Book, the main particulars and details of class for the ship.

2.1.2 Classification process covers the following:

2.1.2.1 The criteria for classification are developed and is contained in DBS Rules and Regulations based on:

a. independent research and development activities of DBS;
b. applicable international Codes and Conventions;
c. recognized national or international standards; and
d. developments in the ancillary industries.

2.1.2.2 Appraisal of the design during and after construction, surveys at the time of construction, entry in the class and modifications so as to ascertain that the ship meets the criteria specified and stipulated by the Rules.

2.1.2.3 Issuance of a “Certificate of Class” and entering the particulars of the ships in to DBS Register of Ships.

2.1.2.4 To ascertain continued maintenance of conditions of classifications, conducting periodical surveys as stipulated by the Rules.

2.1.2.5 Due to damages, reported poor condition of the ship by Port State Control Authorities, etc., conducting additional surveys as deemed necessary by Dromon Council.

2.1.3 DBS frame the Rules and Regulations based on experience gained through the survey reports and feedback, independent research and development activities carried out by DBS or any other acceptable means under its quality management system. With a view to participate in the process of classification, the draft rules, regulations and proposed amendments to the rules are circulated across all the sections of the maritime industry including the flag states who have authorized DBS to perform statutory surveys under various national and international regulations, associations of ship owners, shipbuilders, underwriters, etc. The comments or suggestions are invited from them, either through correspondence or through the formation of Technical Advisory Committees. Finally, the rules are approved by the Technical Committee of DBS after considering various suggestions received from all interested parties of the maritime industry.

2.1.4 The right to amend or alter the Rules and Regulation are reserved by the Technical Committee and it does not need to give any advance notice to its Customers in this case.

2.1.5 Rules, regulations or amendments approved by the Technical Committee enter in to force after six months from the date of approval, unless specifically decided otherwise by the Technical Committee.

2.2 Definitions

Clear water	Water having ample depth to permit the normal development of wind generated waves.
Fetch	The extent of clear water across which a wind has blown before reaching the ship.
Sheltered water	Water where the fetch is six nautical miles or less.
Reasonable weather	Reasonable weather is assumed to exclude winds exceeding Beaufort force six associated with sea states resulting in green water being frequently taken on board the ship's deck. However, it is realised that this is largely a matter of judgment and good seamanship and can vary for ships.

Type notation	A notation indicating that the ship has been designed and constructed with applicable Rules to that type of ship, e.g. "Bulk Carrier", "Oil Tanker", etc.
Cargo notation	A notation indicating that the ship has been designed, modified or arranged to carry one or more cargoes, e.g. "Phosphoric Acid". Ships with one or more cargo notations are not thereby prevented from carrying other cargoes for which they are deemed appropriate.
Special feature notation	A notation indicating that the ship incorporates special features which significantly affect the design, e.g. "movable decks".
Service restriction notation	A notation indicating that a ship has been classed on the understanding that it will be operated only in suitable areas or conditions which have been agreed to by DBS e.g. "Inland Water Service".
Anniversary date	The due date for annual surveys every year, which shall coincide with the expiry date for the certificate of class.
Ballast Tank	A tank which is being used primarily for water ballast.
Spaces	They are distinct compartments including holds and tanks.
A Transverse Section	includes all longitudinal members such as plating, longitudinals and girders at the deck, side, bottom, inner bottom, hopper side, wing tanks and longitudinal bulkhead. For transversely framed vessels, a transverse section includes adjacent frames and their end connections in way of transverse section.
Representative Spaces	Those, which are expected to reflect the conditions of other spaces of similar type and service and with similar corrosion protection systems. When selecting representative spaces, account should be taken of the service and repair history on board and identifiable critical and/or Suspect Areas.
Suspect Areas	They are locations showing Substantial Corrosion and/or are considered by the Surveyor to be prone to rapid wastage.
Substantial Corrosion	An extent of corrosion such that assessment of corrosion pattern indicates wastage in excess of 75% of allowable margins, but within acceptable limits.
Protective Coatings	They are usually epoxy coating or equivalent. Other coating systems may be considered acceptable as alternatives provided that they are applied and maintained in compliance with the manufacturer's specification.
Coating condition	is defined as follows: ▪ GOOD condition with only minor spot rusting. ▪ FAIR condition with local breakdown at edges of stiffeners and weld connections light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition. ▪ POOR condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration
Disclassed	means class has been suspended or withdrawn.
Dual class vessel	means a vessel which is classed by two Societies between which there is a written agreement regarding sharing of work.
Recommendations and Conditions of Class	are to be read throughout this Procedural Requirement as being different terms used by Societies for the same thing, i.e. requirements to the effect that specific measures, repairs, surveys etc. are to be carried out within a specific time limit to retain class.
Exceptional circumstances	means unavailability of dry-docking facilities; unavailability of repair facilities; unavailability of essential materials, equipment or spare parts; or delays incurred by action taken to avoid severe weather conditions.
Force Majeure	means damage to the ship; unforeseen inability of the Society to attend the vessel due to the governmental restrictions on right of access or movement of personnel; unforeseeable delays in port or inability to discharge cargo due to unusually lengthy periods of severe weather, strikes or civil strife; acts of war; or other force majeure.

2.3 Application of rules

2.3.1 In case DBS does not specify otherwise, the regulations contained in this Part or amendments there to shall be applicable to all ships classed by DBS from the date of entry into force.

2.3.2 In case DBS has not specified otherwise, the rules and regulations or amendments there to shall not be applicable to a ship whose keel has been laid or after the approval of original mid ship section or equivalent structural plans prior to the date of entry into force of the rules or its amendments. Where it is intended that existing previously approved plans are used for a new contract, written application is to be made to DBS.

2.3.3 At its discretion the Technical Committee may develop any rules which have entered in to force for ships for which keel was laid or the mid ship section plan was approved, prior to entering in to force of such rules, regulations or amendments thereto, in case of vessels where no substantial construction has been progressed for a long duration after the date of entering force of such rules, regulations or amendments thereto.

2.4 Scope of classification

2.4.1 Classification covers marine vessel's hull structure, appendages and machinery including electrical systems to the extent as specified in these Rules and Regulations.

2.4.2 During and after construction, review of design and survey to verify compliance with Rules and Regulations.

2.4.3 To assign registration of class on verification of compliance with Rules and Regulations.

2.4.4 Yearly renewal of classification certificate with endorsements.

2.4.5 On application by Builder or Owner, certain installation, e.g. refrigerating machinery may be classed by DBS.

2.4.6 Nothing contained in any certificate or report is to be deemed to relieve any designer, builder, Owner, manufacturer, seller, supplier, repairer, operator, insurer, or other entity or person of any duty to inspect or any other duty or warranty express or implied. Any certificate or report evidences only that at the time of survey the vessel, structure, item of material, equipment or machinery, or any other item covered by a certificate or report complied with one or more of the Rules, guidelines, standards, or other criteria of DBS and is issued solely for the use of DBS, its Committees, its Customers, or other authorised entities.

2.4.7 DBS cannot insure or guarantee the integrity or safety of a ship or of any of its equipment or machinery. The validity, applicability, and interpretation of any report, certificate, plan or document review or approval are governed by the Rules and standards of DBS who shall remain the sole judge thereof. Also, it is not responsible for the consequences of the use of the Rules, guidelines, standards, or other criteria of DBS by other parties, without review, plan approval, and survey by DBS.

2.5 Class Characters and Notations

2.5.1 General

2.5.1.1 At Owner’s request, DBS may assign a class to a new or existing ship, as well as confirm, renew, withdraw or reinstate class of an existing ship classed with DBS.

2.5.1.2 DBS may suspend or withdraw ship’s class for reasons specified in Sections 2.11 to 2.14 and 2.15 of this Chapter.

2.5.1.3 Class of a ship is confirmed by the issue of Certificate of Class. The main symbol of class with additional marks is given in the Certificate of Class that also includes a Supplement explaining each symbol of class.

2.5.2 Period of ship’s Class validity
Class of a ship is assigned or renewed, in general, for five (5) years. Having regard to the technical condition of the hull, machinery or electrical equipment, DBS may assign a class to a ship for a shorter period or may shorten the class validity, as a result of the Class Renewal Survey, inserting an appropriate mark in the symbol of class.

2.5.3 Main symbol of Class

2.5.3.1 Main symbol of class of a ship built under the supervision of DBS or an IACS Classification Society Member:

1. The main symbol of class of a ship built under DBS' survey consists of the mark + and the marks 10A1, inserted after it: **+10A1.**
2. Survey, in result of which the ship is assigned a class with one of the above main symbols, covers at least:
   a. approval of documentation;
   b. survey of the manufacture of materials, machinery, installations and equipment;
   c. survey of building the ship and the main engine and boilers, where fitted; and
   d. survey of mooring and sea trials.
3. If a ship has been built under the survey of an IACS Classification Society Member, DBS may assign the main symbol of class to an existing ship as in paragraph 2.5.3 of this Section, subject to:
   a. approval of current technical documentation; and
   b. arranging a Class Initial Survey within the scope of Class Renewal Survey, including recommendations and conditions of class stated in the ship's classification status issued by the previous Society.

2.5.3.2 Main symbol of class of a ship built without DBS' survey:

1. If a ship has been built under the survey of another Classification Society and has then been assigned DBS class, the following main symbol of class is given: **10A1**
2. If a ship has not been built under the survey of any Classification Society, but has later been assigned DBS class, the main symbol of class is put in brackets: **(10A1)**

2.5.3.3 Main symbol of class of a ship with an auxiliary mechanical propulsion:
A sailing ship with an auxiliary mechanical propulsion may be assigned the symbol of class: +10A1 or 10A1 or (10A1) whichever appropriate if the power of this propulsion enables to obtain a speed of at least 7 knots in still water. In such a case a note informing of an auxiliary character of the mechanical propulsion will be entered in the Certificate of Class.

2.5.4 Additional marks in the Main Symbol of Class

2.5.4.1 General:

1. Additional marks in the symbol of class indicate the ship type, obligatory requirements or limitations relevant to the ship type or its operation ability, as well as additional ship structure or adaptation features.
2. Additional marks are affixed to the symbol of class upon compliance with requirements specified in the respective Part of the Rules.
3. Additional marks in the symbol of class are put after the main symbol of class, e.g. +10A1 PASSENGER I [1] L3 IWS AUT.
4. DBS may delete or alter the additional mark in the symbol of class in the case of modification of conditions upon which the mark has been affixed or at the Owner's request.
5. Explanation of some abbreviations associated with additional marks are given in Table 1 and 2 below.

2.5.4.2 Additional marks indicating the ship type

1. Ships complying only with the basic requirements for the given type specified in the respective Parts of the Rules, are assigned the mark affixed to the symbol of class as outlined in Table 1 below.
2. Ship complying with the basic requirements specified for the given type, as well as with the relevant additional requirements, specified in the respective Parts of the Rules, are assigned one of the below given marks affixed to the main symbol of class as outlined in Table 2 below.
3. Ships complying with the requirements specified for two or more ship types are assigned additional mark in the symbol of class, which is a combination of particular marks, for e.g. TUG/SUPPLY VESSEL, TUG/OIL RECOVERY VESSEL, FERRY/PASSENGER, RO– RO/PASSENGER, ORE/BULK CARRIER.
4. DBS may assign to the ship another mark indicating the ship type if considers it is technically justified. In such case, the additional requirements are to be specified by DBS in each particular case. Additional marks indicating obligatory requirements or limitations relevant to the ship Type or its operation ability are shown in the below Table 2 below.

Type of ship	Symbol of DBS class
General Cargo ship	**GENERAL CARGO**
Passenger ship	**PASSENGER**
Roll on-roll off ship	**RO-RO**
Ferry	**FERRY**
Bulk carrier	**BULK CARRIER**
Ore carrier	**ORE CARRIER**
Cement carrier	**CEMENT CARRIER**
Crude oil tanker	**CRUDE OIL TANKER**
Product carrier carrying cargoes with an ignition temperature not exceeding 60 °C (closed cup test) and with a pressure of vapour (acc. To Reid) below the atmospheric pressure	**PRODUCT CARRIER A**
Product carrier carrying cargo with an ignition temperature above 60 °C (closed cup test)	**PRODUCT CARRIER B**
Tanker carrying only specified liquid cargo in bulk (other than oil tanker, product carrier, chemical tanker or gas tanker)	**TANKER FOR...**. (in place of dots, type of cargo, e.g. FRESH WATER is to be put)
Gas tanker	**LIQUEFIED GAS TANKER**
Chemical tanker	**CHEMICAL TANKER**
Container ship	**CONTAINER**
Reefer carrier	**REEFER CARRIER**
Livestock carrier	**LIVESTOCK CARRIER**
Fishing vessel	**FISHING VESSEL**
Fishing cutter	**FISHING CUTTER**
Tug	**TUG**
Supply vessel	**SUPPLY VESSEL**
Rescue vessel	**RESCUE VESSEL**
Firefighting ship	**FIRE FIGHTING SHIP**
Ship for operation in oil spillage	**OIL RECOVERY VESSEL**
Research ship	**RESEARCH SHIP**
Training ship	**TRAINING SHIP**
Floating crane	**FLOATING CRANE**
Dredger	**DREDGER**
Non-propelled barge	**NON-PROPELLED BARGE**
Barge	**BARGE**
Pontoon	**PONTOON**
High speed craft	**HSC**

Table 1 - Type specified symbols affixed to the symbol of class

Ship Type	Applicability	Mark
All ship types	When the classification cycle is shortened to three (3) years	**<3**
	When the classification cycle is shortened to two (2) years	**<2**
	When the classification cycle is shortened to one (1) year	**<1**
Ship has been built with preferences for the given area of navigation	Navigation on open seas up to 200 nautical miles from the port of refuge and with an allowable distance between two ports of refuge up to 400 nautical miles and navigation on enclosed seas	**I**
	Navigation on open seas up to 50 nautical miles from the port of refuge and with an allowable distance between two ports of refuge up to 100 nautical miles and navigation on enclosed seas, within the limits determined for each case and specified in the Certificate of Classification, as well as navigation on the Baltic Sea	**II**
	Navigation on the open and enclosed seas up to 20 nautical miles from the coastline, within the limits determined for each case and specified in the Certificate of Classification or ensuing from the additional mark affixed to the symbol of class	**III**
RO-RO and FERRY type Passenger Ships carrying vehicles with petroleum tanks	Ships carrying vehicles with petroleum tanks	**PET**
Passenger Ships	Figures in brackets indicate the number of compartments after the flooding of which a ship should remain afloat in a satisfactory state of equilibrium	**[1] Or [2]**
Subdivision mark for cargo ships	Probability of damage survival has been determined	**[s]**
Ice strengthening marks	sail unaided in winter in non-Arctic seas in extremely heavy ice conditions	**E1A**
	sail unaided in winter in non-Arctic seas in heavy ice conditions	**E1**
	sail unaided in rarefied fine ice pieces of non-Arctic seas in medium ice conditions	**E2**
	sail unaided in rarefied fine ice pieces of non-Arctic seas in light ice conditions	**E3**
	sail unaided occasionally in fine ice pieces of coastal areas of non-Arctic seas	**E4**
Ro-ro cargoes	decks strengthened for the carriage of ro-ro cargoes	**SD**
	movable decks	**MD**
Ship, other than container ship	carriage of containers	**ACC (...)** Design number of twenty-foot equivalent units (TEU) is given in brackets.
Cargo vessels	carriage of bulk cargoes/ heavy bulk cargo may be distributed unevenly on the ship's length	**HC/ALT**
	carriage of bulk cargoes /at least one hold may remain empty at loading the ship to the highest load line	**HC/E**
	strengthening of the ship for lying aground during loading operations	**LAL**
	performing unloading operations with the use of cargo grabs.	**CG**
	strengthening for mooring to other ships at sea	**MS**
	corrosion additions are reduced, or omitted /corrosion additions are reduced or omitted	**PAC**
	performing in-water Bottom Survey	**IWS**
Oil tankers and combination carriers	Segregated ballast mark	**SBT**
	Crude oil washing mark	**COW**
Oil tankers, chemical tankers and combination carriers	Mark of a protective location of segregated ballast tanks	**PLT**
	Mark of inert gas system	**ING**
Cargo ships	Mark of ships adapted for the carriage of timber	**TIMBER**
Fishing vessels	Mark of fishing equipment	**FE**
Oil tankers, Product tankers, Chemical tankers, Bulk carriers ≥ 500 GT	Enhanced survey programme	**ESP**
All types of vessels	machinery spaces being capable of unattended operation during at least 8 consecutive hours	**AUT**
	one man bridge operation	**NAV 1**
	machinery has been built under DBS survey	**+MC**
	another Classification Society has classed the machinery and then it has been assigned a class of DBS	**MC**
	machinery has not been classed by any Classification Society and then it has been assigned a class of DBS	**(MC)**

Table 2 – Additional marks affixed to the symbol of class

2.6 Materials

It is required that the materials which are to be used in the construction of hull and machinery intended for classification, or in the repair of vessels already classed, are of good quality and free from defects and are tested in accordance with the relevant Rules. The steel is to be manufactured by an approved process at works recognized by DBS (refer to Note 1). Alternatively, tests to the satisfaction of DBS will be required to demonstrate the suitability of the steel.

--- Note 1 ---
Consideration may be given by DBS at their sole discretion to recognize the works on the approved list of Classification Societies with whom DBS currently has Dual Class Agreements for this purpose. Such approval of works is intended for limited periods only and may call for such tests and/or examination to be conducted by the Surveyors of DBS as may be decided from time to time.
--- End of note ---

2.7 Date of contract for construction

2.7.1 The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date along with the construction numbers (i.e. hull numbers) of all the vessels is included in the contract and is also declared to DBS by the party applying for the assignment of class to a new building.

2.7.2 The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.
For the purpose of the requirement given above, vessels built under a single contract for construction are referred to as "series of vessels", if they are built to the same approved plans for classification purposes. However, vessels within a series may have altered design compared to the original design provided:

1. such alterations do not affect matters related to classification; or
2. the alterations are subject to classification requirements and fulfill the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, fulfill the classification requirements in effect on the date on which the alterations are submitted to DBS for approval;
3. the optional vessels will be considered part of the same series of vessels if the option is exercised not later than one (1) year after the contract to build the series was signed.

2.7.3 The date of "contract for construction" for vessels whose contract for construction is amended to include additional vessels or additional options is the date on which the amendment to the contract is signed between the prospective owner and the shipbuilder. The amendment is considered as a "new contract" and the conditions of paragraphs 2.8.1 and 2.8.2 of DBS apply on this.
If "contract for construction" is so amended that the ship type is changed, the date of "contract for construction" of this modified vessel, or vessels, is also modified and it now becomes the date on which revised contract or new contract is signed between the Owner (or Owners) and the shipbuilder.

2.8 Date of build

2.8.1 In the Register Book, the "date of build" will be the Date on which keel was laid or ship was at a similar stage of construction or, where applicable, date on which work for a conversion or an alteration or modification of a major character was commenced.

2.8.2 When complete replacement or addition of a main portion of the ship (e.g. forward section, midship section or aft section) is involved, the following applies:

2.8.2.1 On the Certification of Class, date of build assigned to each portion of the ship will be indicated in the Register Book; the date of modification will also be indicated.

2.8.2.2 Survey requirements shall be based on the date of build related to each main portion of the ship.

2.9 Certificates

2.9.1 General regulations

2.9.1.1 In result of the performed survey, DBS issues the relevant documents.

2.9.1.2 DBS certificates are issued based on the assessment of the surveyed object technical condition.

2.9.1.3 DBS may, for its own survey needs, accept, wholly or in part, the certificates issued by other Classification Societies.

2.9.2 Certificate of Classification

2.9.2.1 The certificates confirming compliance of the vessel with DBS Rules are:
a. Interim Certificate of Classification;
b. Conditional Certificate of Classification; and
c. Certificate of Classification.
Each Certificate of Classification is accompanied with a Supplement that outlines further information on the ship and explanation of the symbols of class.

2.9.2.2 Interim Certificate of Classification is a provisional document issued by DBS Surveyors upon completion of the initial survey for the assignment of class or after the renewal survey or in the case of such modifications made in hull and machinery installations that would necessitate changes the entries.

2.9.2.3 Interim Certificate of Classification is valid until the issue of the Full Term Certificate of Classification, but for a period not exceeding six months from the date of issue. Extension can be granted to the validity of Interim Certificate of Classification following approval by Dromon Council.

2.9.2.4 Certificate of Classification is issued by DBS Head office in proof of the assignment of class to a floating unit or refrigerating plant, after a thorough consideration of the request for class assignment made by DBS Surveyor performing the given survey.

2.9.3 Statutory Certificates

2.9.3.1 Statutory certificates issued by DBS to vessels and other floating units under the authority of a flag State may, depending on the scope of authorization, be:
a. Full Term statutory certificates, or other form of documents, which a vessel or floating unit should have to operate; or
b. Provisional statutory certificates, which constitute partial or full technical basis for the issuance of the Full Term statutory certificates.

2.9.3.2 The form of statutory certificates, conditions of their issue and loss of validity are specified by the appropriate international conventions, national regulations and DBS Rules for the convention equipment.

2.9.4 Special Survey Certificates

2.9.4.1 In result of survey conducted on a floating unit under construction, not covered by DBS Rules, a certificate, specified in the contract/ request for special survey, is issued. The document referred shall contain at least the following data on the surveyed object:
a. Identification data;
b. Statement concerning the floating unit technical condition;
c. Service area; and
d. Document validity.

2.9.4.2 In result of the conducted and/or completed non–marine survey, DBS issues documents specified in the contract–request for survey.

2.9.5 Certificates for survey of materials and manufacturer products

2.9.5.1 In result of direct survey of the manufacturer of materials and products, DBS issues certificates of compliance and examination certificates.

2.9.5.2 Certificates, confirmed by DBS, issued by material manufacturers, as well as documents issued by, recognized by DBS, testing stations or laboratories for the performed tests are equivalent to certificates or tests and examinations certificates issued by DBS.

2.9.5.3 For materials and products manufactured under indirect survey, the holder of DBS Type Approval Certificate as granted according to the procedure specified in Section 4 of this Chapter, issues its own documents in which reference is made to Type Approval Certificate Number. Such document is equivalent to a certificate or tests and examinations certificate issued by DBS.

2.10 Repairs and alterations

2.10.1 When there is any damage or wear and tear to the vessel, its hull, machinery and/or equipment, the repairs which are required for the maintenance of ship's class are to be performed immediately to the satisfaction of the Surveyor at the first port of call or as agreed otherwise with DBS.

2.10.2 Where ship is damaged to an extent that there is towage outside port limits, it is the Owner's responsibility to notify DBS at the first opportunity. However, where such repairs are to be performed at a port where there is no Surveyor of DBS, arrangement for the survey by DBS's surveyor is to be made at the earliest opportunity.

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

2.10.4 Any proposed alterations of the vessel's hull, machinery or equipment are required to get an approval from DBS in advance and so plans and technical particulars are also to be submitted in advance. Such approved alterations are to be performed under the supervision of, and to the satisfaction of the Surveyor.

2.11 Suspension and reinstatement of class in the case of overdue surveys

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

2.11.2 Owners are to be notified that the 5-year Class Certificate expires, and classification is automatically suspended, from the certificate expiry date in the event that the Special (Renewal) Survey has not been completed or is not under attendance for completion prior to resuming trading, by the due date, or by the expiry date of any extension granted in paragraph 2.9.2 of this Section.
Classification will be reinstated upon satisfactory completion of the surveys due. The surveys to be carried out are to be based upon the survey requirements at the original date due and not on the age of the vessel when the survey is carried out. Such surveys are to be credited from the date originally due. However, the vessel is disclassed from the date of suspension until the date class is reinstated.

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

a. annual survey;
b. re-examination of Recommendations / Conditions of Class;
c. progression of the Special Survey as far as practicable;
d. in the case where dry docking is due prior to the end of the class extension, an underwater examination is to be carried out by an approved diving company. An underwater examination by an approved company may be dispensed with in the case of extension of dry-docking survey not exceeding 36 months interval provided the ship is without outstanding Recommendation / Condition of Class regarding underwater parts.

2.11.2.2 In the case that the Certificate of Classification will expire when the vessel is expected to be at sea, an extension to allow for completion of the Special Survey may be granted provided there is documented agreement to such an extension prior to the expiry date of the certificate, and if positive arrangements have been made for attendance of the Surveyor at the first port of call, and if DBS is satisfied that there is technical justification for such an extension. Such an extension is to be granted only until arrival at the first port of call after the expiry date of the certificate. However, if owing to "exceptional circumstances" the special survey cannot be completed at the first port of call, paragraph 2.9.2 of this Section may be followed, but the total period of extension shall in no case be longer than three months after the original due date of the special survey.

2.11.3 Annual Surveys: Owners are to be notified that the Certificate of Classification becomes invalid, and classification is automatically suspended, if the Annual Survey has not been completed within three (3) months of the due date of the annual survey, unless the vessel is under attendance for completion of the Annual Survey.
Classification will be reinstated upon satisfactory completion of the surveys due. Such surveys are to be credited from the date originally due. However, the vessel is to be disclassed from the date of suspension until the date class is reinstated.

2.11.4 Intermediate Surveys: Owners are to be notified that the Certificate of Classification becomes invalid, and classification is automatically suspended, if the Intermediate Survey has not been completed within three (3) months of the due date of the third annual survey in each periodic survey cycle, unless the vessel is under attendance for completion of the Intermediate Survey.
Classification will be reinstated upon satisfactory completion of the surveys due. Such surveys are to be credited from the date originally due. However, the vessel is to be disclassed from the date of suspension until the date class is reinstated.

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

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

2.11.7 When a vessel is intended for a demolition voyage with any periodical survey overdue, the vessel's class suspension may be held in abeyance and consideration may be given to allow the vessel to proceed on a single direct ballast voyage from the lay up or final discharge port to the demolition yard. In such cases a Conditional Certificate of Classification with conditions for the voyage noted may be issued provided the attending Surveyor finds the vessel in satisfactory condition to proceed for the intended voyage.

2.11.8 Force Majeure: If, due to circumstances reasonably beyond the owner's or DBS control as defined above, the vessel is not in a port where the overdue surveys can be completed at the expiry of the periods allowed above, DBS may allow the vessel to sail, in class, directly to an agreed discharge port, and if necessary, hence, in ballast, to an agreed port at which the survey will be completed, provided DBS:

1. exams the ship's records;
2. carries out the due and/or overdue surveys and examination of Recommendations / Conditions of Class at the first port of call when there is an unforeseen inability of DBS to attend the vessel in the present port; and
3. has satisfied itself that the vessel is in condition to sail for one trip to a discharge port and subsequent ballast voyage to a repair facility if necessary (where there is unforeseen inability of DBS to attend the vessel in the present port, the master is to confirm that his ship is in condition to sail to the nearest port of call).

The surveys to be carried out are to be based upon the survey requirements at the original date due and not on the age of the vessel when the survey is carried out. Such surveys are to be credited from the date originally due.
If class has already been automatically suspended in such cases, it may be reinstated subject to the conditions prescribed in this paragraph.

2.11.9 When a vessel is intended for a single voyage from laid-up position to repair yard with any periodical survey overdue, the vessel's class suspension may be held in abeyance and consideration may be given to allow the vessel to proceed on a single direct ballast voyage from the site of lay up to the repair yard, upon agreement with the Flag Administration, provided DBS finds the vessel in satisfactory condition after surveys, the extent of which are to be based on surveys overdue and duration of lay-up. A Conditional Certificate of Classification with conditions for the intended voyage may be issued. This is not applicable to vessels whose class was already suspended prior to being laid-up.

2.12 Suspension and reinstatement of class in the case of overdue recommendations / conditions of class

2.12.1 Each recommendation / condition of class will be assigned a due date for completion. Owners will be notified of these dates and that the vessel's class will be subject to a suspension procedure if the item is not dealt with, or postponed by agreement, by the due date.

2.12.2 Classification will be reinstated upon verification that the overdue recommendation / condition of class has been satisfactorily dealt with. However, the vessel is to be disclassed from the date of suspension until the date class is reinstated.

2.13 Suspension and reinstatement of class of dual classed vessels

2.13.1 When a vessel is dual classed (one of the involved societies is DBS) and if one of the Societies involved acts to suspend the class of the vessel for technical reasons, the Society concerned will advise the other Society of the reasons for such action and the full circumstances within five (5) working days.

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

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

2.14 Suspension and reinstatement of class for other reasons

2.14.1 In addition to the reasons specified in paragraphs 2.11 to 2.13 of this Section, DBS may suspend the class of a vessel for the following reasons:

1. where the assumptions related to handling of the vessel or the provisions for maintenance of class have been violated;
2. when the surveys relating to specific additional notations of hull and/or equipment and/or machinery have not been executed and thereby the vessel is not allowed to retain that notation, then the specific notation will be suspended till the time related surveys are completed;
3. in case fees or expenses chargeable for the service rendered are not paid;
4. when the vessel proceeds to sea either with less freeboard or when the freeboard marks are placed higher on the vessel's sides than the position assigned or approved by DBS;
5. the vessel is run in a manner contrary to that agreed at the time of classification, or is being run in unsafe and unreliable conditions or in areas more tedious than those agreed;
6. in case the Owner fails to notify DBS of any damage to the vessel‘s hull, machinery or equipment, which may unfavorably affect classification or subsequently fails to make adequate arrangements for the survey as advised by DBS;
7. following vessel’s major casualty viz. grounding, breaking up or sinking and when the Owner is unable to arrange for the vessel’s survey and initiate repairs within a reasonable period of the occurrence of the casualty, unless otherwise agreed with DBS;
8. if the vessel has been detained as a result of Port State Control inspection twice in a two-year period and the deficiencies are found to be serious; and
9. if the vessel was found in the last 12 months to have its Automatic Identification System (AIS) switched off and when the AIS switch-off is not in accordance with SOLAS Regulation V/19.

2.14.2 The decision to suspend a vessel's class is made by Dromon Council. Where the decision has been made, the Owner will be notified in writing and it may come into immediate effect or after a specified period. In cases of automatic suspension, no individual decision is made.

2.15 Withdrawal of class

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

2.15.2 In addition to the reason specified in paragraph 2.15.1 of this Section, the class can be withdrawal:

1. at Owner's request;
2. when the vessel proceeds to sea without having rectified a recommendation / condition of class, which was required to be dealt with prior to leaving port;
3. if the outstanding debt owed to DBS is not paid within a fixed date. This also applies when payment is received by local representative but is not remitted to DBS; and
4. when the Rules and Regulations as regards surveys of the hull and/or equipment and/or machinery have not been fulfilled and the vessel thereby is not able to retain class or additional class notation.

2.16 Notification and Reporting

2.16.1 DBS is to confirm in writing the suspension of class and reinstating of the vessel's class to the Owner and to the Flag State.

2.16.2 DBS is to confirm in writing the withdrawal of class to the Owner and to the Flag State.

2.16.3 For vessels to which SOLAS applies, the letters according to paragraphs 2.16.1 and 2.16.2 of this Section are to state that statutory certificates are implicitly invalidated by the suspension / withdrawal of class.

2.17 Deletion of class

A vessel will "cease to exist" when:

1. it is ruined by scrapping; or
2. it sinks to unfathomable depths; or
3. it is damaged due to grounding or structural failure or due to effects of war or sabotage; or
4. it is abandoned by the owner.

Vessel's class will be deleted when it "ceases to exist".

2.18 Reclassification

If the reason leading to class suspension is rectified within stipulated time, the class will be reinstated, and the existing Certification of Classification shall retain its validity. In all other cases, a vessel's class may only be reinstated upon a written request from the Owner. In such circumstances, the survey extent will be dependent upon the vessel's classification status at the time of suspension or withdrawal.

2.19 Survey Reports

2.19.1 The Surveyor completes all the reports of the survey in the form of DBS quality management system.

2.19.2 The reports, prepared by the Surveyor, shall be open for inspection by the Owner or any other representative authorised by the Owner in writing. Copies of the reports will be supplied to Owners or their representatives.

Section 3 – Requirements for service providers

3.1 General

3.1.1 The objective of this procedure is to set minimum requirements for approval and certification of service suppliers and is applicable to both initial and renewal audits.

3.1.2 To approve firms providing services, such as measurements, tests or maintenance of safety systems and equipment, DBS is setting in the herein Section the minimum requirements to be satisfied.

3.2 Definitions

Manufacturer	A company that manufactures equipment required to be periodically serviced and/or maintained.
Service Supplier (A Service Supplier or category of Service Supplier may be referred to here after simply as 'supplier')	A person or company, who at the request of an equipment manufacturer, shipyard, vessel's owner or other client acts in connection with inspection work and provides services for a ship or a mobile offshore drilling unit such as measurements, tests or maintenance of safety systems and equipment, the results of which are used by surveyors in making decisions affecting classification or statutory certification and services.
Agent	A Person or Company authorised to act for or to represent a Manufacturer or approved/recognized service supplier.
Subsidiary	A Person or Company providing services to a Manufacturer or approved/recognized service supplier, with a formal contract defining the assumption of the obligations of the service supplier.
Subcontractor	A notation indicating that the ship has been designed and constructed with applicable Rules to that type of ship, e.g. "Bulk Carrier", "Oil Tanker", etc.
"Off-load release mechanism"	A release mechanism which releases the survival craft/rescue boat/fast rescue boat when it is waterborne or when there is no load on the hooks.
"On-load release mechanism"	A release mechanism which releases the survival craft/rescue boat/fast rescue boat with load on the hooks.
"Repair"	Any activities requiring disassembly of equipment, or any other activities outside the scope of the instructions for on-board maintenance and for emergency repair of life-saving appliances prepared in accordance with SOLAS regulations III/36.2 and III/35.3.18, respectively.
"Overhaul"	A periodical activity defined by the manufacturer that proves continued fitness for purpose for a defined period subject to correct maintenance.

3.3 Application

3.3.1 This procedure applies to the approval of the following categories of service suppliers:

3.3.1.1 Statutory services

1. Firms engaged in servicing inflatable liferafts, inflatable lifejackets, hydrostatic release units, inflatable rescue boats, marine evacuation systems
2. Firms engaged in inspections and testing of radio communication equipment
3. Firms engaged in inspections and maintenance of self-contained breathing apparatus
4. Firms engaged in annual performance testing of Voyage Data Recorders (VDR) and simplified Voyage Data Recorders (S-VDR)
5. Firms engaged in sound pressure level measurements of public address and general alarm systems on board ships

6. Firms engaged in inspections of low location lighting systems using photo luminescent materials and evacuation guidance systems used as an alternative to low-location lighting systems
7. Firms engaged in servicing and maintenance of lifeboats, launching appliances, onload release gear and davit-launched liferaft automatic release hooks
8. Firms engaged in inspection, performance testing and maintenance of Automatic Identification Systems (AIS)
9. Firms engaged in maintenance, thorough examination, operational testing, overhaul and repair of lifeboats and rescue boats, launching appliances and release gear in accordance with IMO Resolution MSC.402(96)

3.3.1.2 Classification and/or Statutory services:

1. Firms engaged in thickness measurements on ships except
   - non-ESP ships less than 500 gross tonnage and
   - all fishing vessels.
2. Firms carrying out in-water survey of ships and mobile offshore units
3. Firms engaged in inspections and maintenance of fire extinguishing equipment and systems
4. Firms engaged in tightness testing of closing appliances such as hatches, doors etc. with ultrasonic equipment Firms engaged in measurements of noise level on board ships Firms engaged in examination of Ro-Ro ship's bow, stern, side and inner doors
5. Firms engaged in testing of coating systems in accordance with IMO Resolution MSC.215(82), as amended, and IACS UI SC223 and/or IMO Resolution MSC.288(87), as amended.
6. Firms engaged in tightness testing of primary and secondary barriers of gas carriers with membrane cargo containment systems for vessels in service.

3.3.1.3 Where DBS accepts work of a third party (e.g., service supplier) approved by itself, DBS shall verify the performance of such services. For statutory service, the flag State may increase the scope of verification to be applied to these services. The process shall be defined within DBS quality management system. For the purpose of accountability to the flag State, the work performed by the third party (e.g., service supplier) constitutes the work of DBS and shall be subject to the requirements incumbent upon DBS under the RO Code IMO MSC.349 (92) and MEPC.237(65).

3.3.2 Where the results of the following service providers are used by a DBS Surveyor in making decisions affecting classification services then that service provider must be approved and verified by DBS.

3.3.2.1 Firms engaged in thickness measurements on ships except
- non-ESP ships less than 500 gross tonnage and
- all fishing vessels.

3.3.2.2 Firms carrying out in-water survey of ships and mobile offshore units

3.3.2.3 Firms engaged in tightness testing of closing appliances such as hatches, doors etc. with ultrasonic equipment.

3.3.3 Where such services are used by Surveyors in making decisions affecting statutory certification and service, the firms are subject to approval and verification by DBS where DBS is so authorised by the relevant flag Administration (i.e. the flag of the ship on which the servicing is to be done or the service equipment is to be used). For such services DBS may accept approvals done by:
- the flag Administration itself,
- duly authorized organizations acting on behalf of the flag Administration, or
- other organizations those are acceptable to the flag Administration (e.g. other governments, etc.).

3.3.4 Use of the approved service suppliers is not mandatory for the following services, unless instructed otherwise by the flag Administration with respect to statutory certification
- Firms engaged in inspections of low location lighting systems using photo luminescent materials and evacuation guidance systems used as an alternative to low-location lighting systems
- Firms engaged in sound pressure level measurements of public address and general alarm systems on board ships
- Firms engaged in measurements of noise level onboard ships
- Firms engaged in testing of coating systems in accordance with IMO Resolution MSC.215(82) as amended and IACS UI SC223 and/or MSC.288(87) as amended Firms engaged in examination of Ro-Ro ships bow, stern, side and inner doors

3.4 Procedure for Approval and Certification

3.4.1 Submission of documents

3.4.1.1 The following documents are to be submitted to DBS for review:
- Outline of company, e.g. organisation and management structure, including subsidiaries to be included in the approval/certification
- List of nominated agents, subsidiaries and subcontractors
- Experience of the company in the specific service area

- For categories of Service Suppliers that require authorization from manufacturers, manufacturer's documentary evidence that the Service Supplier has been authorized or licensed to service the particular makes and models of equipment for which approval is sought shall be provided.
- List of operators/technicians/inspectors documenting training and experience within the relevant service area, and qualifications according to recognised national, international or industry standards, as relevant
- Description of equipment used for the particular service for which approval is sought
- A guide for operators of such equipment
- Training programmes for operators/technicians/inspectors
- Check lists and record formats for recording results of the services referred to in Table 3 below
- Quality Manual and/or documented procedures covering requirements in paragraph 3.4.4 of this Section
- Documented procedures for communication with the crew prior to commencing work, so that it is safe to decommission the equipment being maintained, and to provide a safe system of work in place
- Evidence of approval/acceptance by other bodies, if any Information on the other activities which may present a conflict of interest
- Record of customer claims and of corrective actions requested by certification bodies

3.4.2 General requirements:

3.4.2.1 Extent of Approval
The supplier shall demonstrate that it has the competence and control needed to perform the services for which approval is sought.

3.4.2.2 Training of personnel
The supplier is responsible for the qualification and training of its personnel to a recognised national, international or industry standard as applicable.

3.4.2.3 Where such standards do not exist, the supplier is to define standards for the training and qualification of its personnel relevant to the functions each is authorised to perform. The necessary equipment.

3.4.2.4 Operators/technicians/inspectors shall have had a minimum of one year tutored on-the-job training. Where it is not possible to perform internal training, a program of external training may be considered as acceptable.

3.4.2.5 Supervision
The supplier shall provide supervision for all services provided. The responsible supervisor shall have had a minimum of two years of experience as an operator/technician/inspector within the activity for which the supplier is approved. For a supplier consisting of one person, that person shall meet the requirements of a supervisor.

3.4.2.6 Personnel records
The supplier shall keep records of the approved operators/technicians/inspectors. The record shall contain information on age, formal education, training and experience for the services for which they are approved.

3.4.2.7 Equipment and facilities
The supplier shall have the necessary equipment and facilities for the service to be supplied. A record of the equipment used shall be kept and available. The record shall contain information on maintenance and results of calibration and verifications. DBS shall assess and record the validity of previous measuring results when the equipment is found not to conform to requirements. DBS shall take appropriate action on the equipment affected.

3.4.2.8 Control of data: When computers are used for the acquisition, processing, recording, reporting, storage, measurement assessment and monitoring of data, the ability of computer software to satisfy the intended application shall be documented and confirmed by the service supplier. This shall be undertaken prior to initial use and reconfirmed as necessary. Note: Commercial off-the-shelf software (e.g. word processing, database and statistical programmes) in general use within their designed application range may be considered to be sufficiently validated and do not require any subsequent confirmation.

3.4.2.9 Where several servicing stations are owned by a given company, each station is to be assessed and approved except as specified in paragraph 3.4.4.3 of this Section.

3.4.2.10 Procedures
The supplier shall have documented work procedures covering all services supplied.

3.4.2.11 Subcontractors
The supplier shall give information of agreements and arrangements if any parts of the services provided are subcontracted. Particular emphasis shall be given to quality management by the supplier in following-up such subcontracts. Subcontractors providing anything other than equipment shall also meet the requirements of paragraphs 3.4.2 and 3.4.4 of this Section.

3.4.2.12 Verification
The supplier shall verify that the services provided are carried out in accordance with approved procedures.

3.4.2.13 Reporting
The report shall be prepared in a form acceptable to DBS. The report should detail the results of inspections, measurements, tests, maintenance and/or repairs carried out. Special guidelines may be given in Table 3 below. The report shall include a copy of the Certificate of Approval.

3.4.2.14 Documented procedures and instructions should be available for the recording of damages and defects found during inspection, servicing and repair work. This documentation is to be made available upon request.

3.4.2 Auditing of the Supplier

3.4.2.1 Upon reviewing the submitted documents with satisfactory result, the supplier is audited in order to ascertain that the supplier is duly organised and managed in accordance with the submitted documents, and that it is considered capable of conducting the services for which approval/certification is sought.

3.4.3 Certification

3.4.3.1 Certification is conditional on a practical demonstration of the performance of the specific service as well as satisfactory reporting being carried out. At renewal audits, evidence of performance, verified by class surveyor, since the previous audit is sufficient to satisfy this requirement.

3.4.4 Quality System

3.4.4.1 The supplier shall have a documented system covering at least the following:
- code of conduct for the relevant activity
- maintenance and calibration of equipment
- training programmes for operators/technicians/inspectors
- supervision and verification to ensure compliance with operational procedures
- recording and reporting of information
- quality management of subsidiaries, agents and subcontractors
- job preparation
- periodic review of work process procedures, complaints, corrective actions, and issuance, maintenance and control of documents

3.4.4.2 A documented Quality system complying with the most current version of ISO 9000 series and including the above items, would be considered acceptable.

3.4.4.3 If a manufacturer of equipment (and/or its service supplier) applies to DBS for inclusion of its nominated agents and/or subsidiaries in the approval, then it must have implemented a quality system certified in accordance with the most current version of ISO 9000 series. The quality system must contain effective controls of the manufacturer's (and/or service supplier's) agents and/or subsidiaries. The nominated agents/subsidiaries must also have in place an equally effective quality system complying with the most current version of ISO 9000 series. Such approvals shall be based upon an evaluation of the quality system implemented by the parent company against the most current version of ISO 9000 series. DBS may require follow-up audits on such agents or subsidiaries against the most current version of ISO 9000 series to confirm adherence to this quality system.

3.4.5 Service Suppliers Relations with the Equipment Manufacturer

3.4.5.1 A company which works as a service station for manufacturer(s) of equipment (and as a service supplier in this field), shall be assessed by the manufacturer(s) and nominated as their agent. The manufacturer shall ensure that appropriate instruction manuals, material etc. are available for the agent as well as proper training of the agent's technicians. Such suppliers shall be approved either on a case by case basis, or in accordance with paragraph 3.4.4.3 of this Section.

3.4 Certification

3.5.1 Upon satisfactory completion of both the audit of the supplier and the demonstration test, as applicable, DBS may issue a Certificate of Approval stating that the supplier's service operation system has been found to be satisfactory and that the results of services performed in accordance with that system may be accepted and utilized by DBS Surveyors in making decisions affecting classification or statutory certification, as relevant. The Certificate shall clearly state the type and scope of services and any limitations or restrictions imposed including type of equipment and/or names of Manufacturers of equipment where this is a limiting restraint. The supplier may also be included in DBS record of approved service suppliers.

3.5.2 Renewal or endorsement of the Certificate is to be made at intervals not exceeding three (3) years by verification through audits that approved conditions are maintained or, where applicable, on expiry of the supplier's approval received from an equipment Manufacturer, whichever comes first. In the latter case, DBS is to be informed in due course by the Service Supplier. For firms engaged in thickness measurements, renewal/endorsement of the Certificate is to be made at intervals not exceeding three (3) years by verification that original conditions are maintained

3.6 Information Regarding Alterations to the Certified Service Operating System

3.6.1 When any alteration to the certified service operating system of the supplier is made, such alteration is to be immediately informed to DBS. Re-audit may be required when deemed necessary by DBS.

3.7 Cancellation of Approval

3.7.1 DBS reserves the right to cancel the approval and to inform the IACS Members accordingly (For Firms engaged in thickness measurements refer to IACS PR23).

3.7.2 Approval may be cancelled in the following cases:

1. Where the service was improperly carried out or the results were improperly reported.
2. Where a Surveyor finds deficiencies in the approval service operating system of the supplier and appropriate corrective action is not taken.
3. Where alterations have been made to the Company's Quality System relevant to the service supplier certificates, without written notification to DBS.
4. Where willful acts or omissions are ascertained.
5. Where any deliberate misrepresentation has been made by the Service Supplier.

3.7.3 A supplier whose approval was cancelled, may apply for re-approval provided it has corrected the non-conformities which resulted in cancellation, and DBS is able to confirm it has effectively implemented the corrective action.

3.7.4 Expiration or cancellation of the Supplier's parent company approval automatically invalidates approval of all agents and subsidiaries if these are certified according to paragraph 3.4.4 of this Section.

3.8 Existing Approvals

3.8.1 Approvals for the categories of service suppliers granted before the date of implementation of this procedure by Dromon may remain valid as stated in the respective certificates for a period up to but not exceeding three (3) years.

Firm engagement	Qualifications	Equipment
Thickness measurements on ships	Qualified according to a recognized national or international industrial NDT standard	On coated surfaces, instruments using pulsed echo technique (either with oscilloscope or digital instruments using multiple echoes, single crystal technique) are required. Single echo instruments may be used on uncoated surfaces, which have been cleaned and ground.
Tightness testing of closing appliances such as hatches, doors etc. with ultrasonic equipment	Have knowledge of different closing appliances such as hatches, doors etc. including their design, functioning and sealing features - Have experience with the operation and maintenance of different closing appliances such as hatches, doors etc. - Be able to document theoretical and practical training onboard in using the ultrasonic equipment specified	ultrasonic equipment
In-water survey of ships and mobile offshore units	Qualified according to the supplier's general requirements and shall have a minimum of two years' experience as a diver carrying out inspection	Closed circuit colour television with sufficient illumination equipment - Two-way communication between diver and surface staff - Video recording device connected to the closed circuit television - Still photography camera - Equipment for carrying out thickness gauging, non-destructive testing and measurements, e.g. clearances, indents, etc., as relevant to the work to be performed - Equipment for cleaning of the hull - Remote Operated Vehicle, if applicable
Inspection and maintenance of fire extinguishing equipment and systems	Professional knowledge of fire theory, fire-fighting and fire-extinguishing appliances sufficient to carry out the maintenance and/or inspections, and to make the necessary evaluations of the condition of the equipment	Various scales to weigh items - Means to hydrostatically pressure test components/systems/storage bottles - Liquid/gas, flow meters, as appropriate - Pressure gauges or manometers - In the cases of foam concentrates and portable fire-extinguishers, chemical analysis equipment and a testing bay, respectively; and - Specific equipment/spares as may be specified by Manufacturer - Level measuring equipment for bottles - Recharging facilities for pressurized bottles, extinguishers and cartridges

Firm engagement	Qualifications	Equipment
Servicing inflatable liferafts, inflatable lifejackets, hydrostatic release units, inflatable rescue boats, marine evacuation systems	Authorised or licensed to service the particular makes and models of equipment for which approval is sought by the equipment's manufacturer.	IMO Res. A.761(18) as amended by MSC.55(66) gives recommendations on conditions for the approval of servicing stations for inflatable liferafts which shall be observed as relevant. Where inflatable liferafts are subject to extended service intervals, MSC.1/Circ.1328 should also be followed.
Inspections and testing of radio communication equipment	Minimum two years education from a technical school, experience as inspector, and should preferably hold a General Operator's Certificate (GOC) or a GMDSS Radioelectronic Certificate (REC), recognised by the ITU, to operate or test radio transmitters. He should be aware of any local conditions for radio signal propagation, of regional radio stations and their facilities, and of the GMDSS infrastructure	Minimum required instruments: - Equipment for measuring frequency, voltage, current and resistance - Equipment for measuring output and reflect effect on VHF and MF/HF - Equipment for measuring modulation on MF/HF and VHF (AM, FM, PM) - Acid tester for checking specific gravity of lead batteries - Tester for checking of correct output from Free-Float Satellite EPIRB - Equipment for testing the performance of Automatic Identification Systems (AIS)
Inspections and maintenance of self-contained breathing apparatus	Knowledge of the equipment and systems sufficient to carry out the inspections and testing of self-contained breathing apparatus to identify standards and to make the necessary evaluation of the condition of the equipment	Sufficient and appropriate spares and tools are to be available for repair, maintenance and servicing of self-contained breathing apparatus in accordance with the requirements of the Manufacturers. These are to include, as required by the self-contained breathing apparatus equipment and/or systems: - Various scales to weigh items - Means to hydrostatically pressure test components/systems/storage bottles - Flow meters; and - Pressure gauges or manometers - Equipment for checking air quality - Recharging facilities for breathing apparatus
Examination of Ro-Ro ships bow, stern, side and inner doors	Minimum of two years' experience as operator/technician/inspector within the activity, a Supervisor is to have a minimum two years related education from a technical school.	For Inspection of Supporting Securing and Locking Devices, Hinges and Bearings: - Equipment for measuring clearances (i.e. feeler gauges, vernier calipers, micrometers). - Non-destructive examination (i.e. dye penetrant, magnetic particle inspection) For Tightness Testing: - Ultrasonic leak detector or equivalent For Inspection of Hydraulic Operating System: - Pressure gauges - Particle counter for analysing the quality of hydraulic fluid For Inspection of Electric Control System and Indication System: - Digital multi-meter - Earth fault detector
Annual performance testing of Voyage Data Recorders (VDR) and simplified Voyage Data Recorders (S-VDR)	Evidence that he has been authorised or licensed by the equipment's manufacturer to service the particular makes and models of equipment for which approval is sought.	the Service Supplier shall have equipment as specified in the authorisation or license from the equipment Manufacturer
Inspections of low location lighting systems using photo luminescent materials and evacuation guidance systems used as an alternative to lowlocation lighting systems	- Have adequate knowledge of the applicable international requirements (namely SOLAS reg. II-2/13.3.2.5, IMO Res. A.752(18) Guidelines for the Evaluation, Testing and Application of Low-Location Lighting on Passenger Ships, ISO 15370-2010, FSSS Code Chapter 11) - Be able to document theoretical and practical training onboard in using equipment specified	The measuring instrument shall incorporate a fast-response photometer head with CIE (International Commission on Illumination) photopic correction and have a measurement range of at least 10-4 cd/m2 to 10 cd/m^2.
Sound pressure level measurements of public address and general alarm systems on board ships	- Have adequate knowledge of the applicable international requirements (SOLAS Reg. III/4 and III/6, LSA CODE Chapter VII/7.2, IMO Code on alarms and indicators, 1995) - Be able to document theoretical and practical training onboard in using equipment specified	The measuring instrument shall be an integrating sound level meter with frequency analyser capabilities complying with IEC (International Electrotechnical Commission) 60651 and IEC 61672, type 1 precision class with, at least an A-weighting frequency response curve and 1/3 octave and 1 octave band filters, complying to IEC 61260, as appropriate for the measurements to be carried out. In addition, microphones shall be of the random incidence type, complying with IEC 60651.
Testing of coating systems		The laboratory is to provide to DBS the following information: - A detailed list of the Laboratory test equipment for the coating approval according to the IMO Resolution MSC.215(82) as amended and/or MSC.288(87) as amended.

Firm engagement	Qualifications	Equipment
		- A detailed list of reference documents comprising a minimum those referred to in IMO Resolution MSC.215(82) as amended and/or MSC.288(87) as amended for the coating approval. - Details of test panel preparation, procedure of test panel identification, coating application, test procedures and a sample test report. - Details of exposure method and site for weathering primed test panels. - A sample daily or weekly log/form for recording test conditions and observations including unforeseen interruption of the exposure cycle with corrective actions. - Details of any sub-contracting agreements (if applicable). - Comparison test report with an approved coating system or laboratory if available.
Servicing and maintenance of lifeboats, launching appliances, on-load release gear and davit-launched liferaft automatic release hooks	Service Suppliers should be trained and qualified in the operations for which they are authorised, for each make and type of equipment for which they provide the service	- Sufficient tools, and in particular any specialized tools specified in the equipment manufacturer's instructions, including portable tools as needed for work to be carried out on board ship - Access to sufficient materials, spare parts and accessories as specified by the equipment manufacturer for repairing lifeboats, launching appliances and on-load release gear, as applicable - For servicing and repair work involving disassembly or adjustment of on-load release mechanisms, availability of genuine replacement parts as specified or supplied by the equipment manufacturer
Measurements of Noise level Onboard Ships	The supervisor shall have a minimum of 2 years of experience as an operator in sound pressure level measurements.	Measurement of sound pressure levels shall be carried out using precision integrating sound level meters. Such meters shall be manufactured to IEC 61672-1(2002-05), as amended, type/class standard as applicable, or to an equivalent standard acceptable to the Administration.
Tightness testing of primary and secondary barriers of gas carriers with membrane cargo containment systems for vessels in service	The responsible supervisor shall be certified to a recognized national or international industrial standard (e.g. Level II, ISO-9712 as amended or SNT-TC-1A as amended) and have one-year experience at Level II.	Thermal cameras and sensors are to be in accordance with the system designer's procedures with regards to sensitivity, accuracy and resolution. Equipment are to be in accordance with recognized standard (IEC, etc.) with regards their safety characteristics for the use in hazardous areas (in gas explosive atmosphere), maintained and calibrated in accordance with the maker's recommendations.

Table 3 - Special Requirements for Various Categories of Service Suppliers

Section 4 – Type approval programme

4.1 General

4.1.1 Applicants are required to submit a signed request for Product Type Approval, indicating all adopted standards by the year of their last issuance. The Type Approval Program is made up of two components, Design Assessment and Manufacturing Assessment:

4.1.1.1 Design Assessment, which is approval of the standard product design, consists of:
a) Design evaluation, and
b) Survey and/or testing of a prototype or a production unit (as appropriate)

4.1.1.2 Manufacturing Assessment, which is approval of the manufacturing process, consists of:
a) Management Assessment. Evaluating the quality assurance and quality control system of the manufacturing facilities in order to assess and verify their capability to meet the manufacturer's specified level of product quality consistently and satisfying the requirements of the Rules, as applicable. Three categories of quality assurance and quality control are included:
   i. Acceptable Quality System (AQS) is a system in substantial agreement with a standard such as ISO 9000 series or equivalent and found acceptable by DBS.
   ii. Recognized Quality Standard (RQS) is a system that is in compliance with a recognized standard at least to ISO 9000 series or equivalent and so certified by a recognized certification body.
   iii. Product Quality Assurance (PQA) is a system meeting the requirements for RQS and having additional approved procedures to carry out tests and surveys as required by the Rules.
b) Production Assessment. Evaluating the product specific manufacturing process of the manufacturer in order to assess and verify that manufacture and inspections of the products are established to provide the manufacturer's specified level of quality control, and to satisfying the requirements of the Rules.

4.1.2 The Design Assessment portion of the Type Approval Program may be applied individually for products submitted without a request for Product Type Approval. It is normally to be done with a signed request for Type Approval, and in conjunction with the Manufacturing Assessment portion of the Type Approval Program. The application of the Manufacturing Assessment portion can be done only in conjunction with Design Assessment. When a manufacturer has already been granted Manufacturing Assessment, further submission of new products or drawing updates do not need to be accompanied by a new request for Type Approval. The purposes of the Type Approval Program are:

4.1.2.1 To avoid repeated evaluation of identical designs,

4.1.2.2 To allow acceptance of the product based on periodic surveillance of the manufacturer's quality assurance program and, where applicable, selective inspection and tests in lieu of surveying and testing individual units at the manufacturer's facility.

4.2 Limitations

4.2.1 The application of the Type Approval Program to a specific product is at the discretion of DBS. Those products that may not be type approved under the Type Approval Program are identified in the appropriate Sections of the Rules. (****) Products for which the Rules require witnessed testing by a Surveyor as part of their certification for use on a vessel, MODU, or facility classed by DBS will require witnessed testing where the option for Acceptable Quality System (AQS) or Recognized Quality Standard (RQS) system is exercised. Where Product Quality Assurance Certificate (PQA) is granted, witnessed testing during the manufacture of the product, which otherwise would be required by the Rules, may be waived at the discretion of the Surveyor in Charge. Where the product is manufactured to an Administration standard, any request to waive witnessed testing must be approved by the Administration.

4.3 Process

4.3.1 Design Assessment (DA)

4.3.1.1 Design Evaluation
Plans showing details of construction, and documentation such as product specifications, performance data, standard of compliance, engineering analyses, etc., as applicable, are to be submitted for review. The design review must first show compliance with applicable requirements of the Rules or to standard as may be permitted by the Rules, prior to further consideration for DBS Type Approval. Products for which there are no specific standards in the Rules may be evaluated based on applicable industry standards or, in the absence of applicable Rules or industry criteria, the manufacturer's standard or specifications and/or engineering analyses. The basis of design evaluation will be commenced in DBS's documentation concerning the product. The design assessment is intended to fulfill the requirements of the first element of the Type Approval Program, as described in paragraph 4.1 of this Section. Design assessment is the first step in determining that, provided that all other Rule requirements are complied with and subject to completion of manufacture and testing to the satisfaction of the attending Surveyor, the product may be used onboard a vessel, MODU or a facility classed by DBS.

4.3.1.2 Survey and/or Testing of Prototype or Production Units

Where applicable, and as deemed necessary for the evaluation process, the manufacturer is to carry out performance, nondestructive, destructive, environmental, or other tests on the product as may be specified in the Rules, in the applicable standard, or in the manufacturer's specifications in the presence of a Surveyor. If the required testing has been or is done in a recognized independent testing facility or in the manufacturer's facility that is certified to ISO 9000 and Recognized Quality Standard (RQS) as described in paragraph 4.3.1 of this Section, that is acceptable to DBS, consideration will be given to acceptance of test results obtained without a Surveyor present. DBS will maintain a list of recognized testing facilities.

4.3.1.3 Design Assessment Certificate

Products evaluated in accordance with Design evaluation and Survey and/or Testing of Prototype or Production Units of paragraph 4.3.1 of this Section and found to be in conformance with the applicable provisions of the Rules, standards, or specifications will be issued a Design Assessment Certificate. Designs so approved will be eligible for listing on DBS website under the Design Approved Products (PDA) index. They will remain in this index until a Manufacturing Assessment Certificate (MA) is issued at which point the listing will be relocated to the Type Approved Product (PTA) index with the MA certificate data added. Design Assessment Certificate, by itself, does not reflect that the product is type approved. For that purpose, manufacturing assessment is to be carried out in accordance with paragraphs 4.3.2 and 4.3.5 of this Section.

4.3.1.4 Product Design Assessment, Limited

When a Product Design Assessment Certificate expires or is superseded by a Rule or specification change, the option of maintaining the listing in the category of Product Design Assessment, Limited (PDA Ltd.) is available. There will be two categories in this PDA Ltd:

a) A product that has expired is pending renewal and requires technical revalidation prior to being used. The term of validity will be one year from the date of expiration of the PDA.
b) A product that will be listed as in compliance with a previous Rule and remains valid only for vessels contracted on or before the effective date of the Rule. The effective date will be included in the service restrictions of the product. The term of validity will be five years subject to continued compliance with the applicable Rule.

4.3.2 Manufacturing Assessment (MA)

4.3.2.1 Quality Assurance Standard

a) Acceptable Quality Standard (AQS). The manufacturer is required to have in place an effective quality assurance system that will be evaluated by Surveyors for essential compliance with a recognized quality standard, such as the ISO 9000 series, or equivalent. The system, as implemented, is to be acceptable to DBS. The evaluation will involve initial, regular and renewal audits of the quality system, in accordance with the provisions of the applicable quality assurance standard. Where considered necessary by the attending Surveyor, more frequent surveillance may be required to maintain the certification.
b) Recognized Quality Standard (RQS). The requirements are the same as those for AQS except that the manufacturer is required to have in place an effective quality assurance system certified by an internationally recognized certification body as complying with a recognized quality standard at least equivalent to the ISO 9000 series. Such certification is to be valid at least during the validity of Manufacturing Assessment Certificate. In addition, the system as implemented by the manufacturer is to be acceptable to DBS. For that purpose, a confirmatory evaluation will be conducted by the Surveyor, which will involve initial, regular and renewal audits of the quality system, in accordance with the provisions of the applicable quality assurance standard. Where considered necessary by the attending Surveyor, more frequent surveillance may be required to maintain the certification.
c) Quality Manual. The manufacturer is also required to maintain a quality manual as may be required by the standard. Where a recognized certification body has approved the Quality Manual, DBS will not require them to be submitted for DBS's approval.

4.3.2.2 Quality Control

Typical quality plans describing methods of assuring and controlling quality during production as may be required by the product specifications or standard will be subject to evaluation by DBS. In particular, quality plans are to indicate specific surveys, tests, etc. wherever required by the Rules. The manufacturer is to present a sample or specimen of the product, representative of the "type" to be approved, to the Surveyor for the purpose of verifying that the "type" has been manufactured in conformance with the design documents.

4.3.2.3 Manufacturing Assessment Certificate (MA)

Manufacturing facilities that are successfully audited in accordance with Quality Assurance Standard and Quality Control of paragraph 4.3.2 of this Section and are found to:

a) Have undergone a satisfactory product design evaluation, and
b) Comply with a quality assurance standard, and
c) Have manufacturing quality control that meets the applicable provisions of the Rules, or of the applicable product standard, or the manufacturer's specifications, will be issued a Manufacturing Assessment Certificate (MA) by the attending Surveyors.

4.3.2.4 Confirmation of Type Approval (CTA)

Those products with both a valid Design Assessment Certificate [see Design Assessment Certificate (DAC) under paragraph 4.3.1 of this Section and a valid Manufacturing Assessment Certificate [see Manufacturing Assessment Certificate (MAC) under paragraph 4.3.2 of this Section is eligible for a Confirmation of Type Approval. The Confirmation of Type Approval represents the information recorded by DBS on the product as of the date and time the certificate is printed.

4.3.3 Product Quality Assurance Certification (PQA)

A Product Quality Assurance Certificate (PQA) will be issued to a manufacturer who has requested that Rule-required surveys and tests be conducted without an DBS Surveyor in attendance. For that purpose, the manufacturer is to meet the requirements for Type Approval as described in [(b) under Quality Assurance Standard of paragraph 4.3.2 of this Section and, in addition, is to have a quality assurance system in operation that is at least as effective as the Surveyor's attendance at those surveys and tests. The scope of manufacturing assessment will be expanded to include a confirmatory evaluation, including at least initial, semi-annual, annual, and renewal audits of the quality system, in accordance with the provisions of the applicable quality assurance standard and DBS own criteria. When requested by the manufacturer, consideration will be given to crediting a semi-annual audit based on a Surveyor's recommendation after attendance for Unit Certification or a surveillance visit on or about the due date of the semi-annual audit. The semi-annual audit will have a window of 30 days before and 30 days after the midpoint between annual audits.

The issuance of a Product Quality Assurance Certificate is contingent upon the recommendation by the attending Surveyor, seconded by the Surveyor in Charge and final approval by the Manager of the Type Approval Program. During the manufacture of the product, the Product Quality Assurance certification will provide an alternative to the requirements for witnessed testing by a Surveyor. This is not a relaxation of the Rule requirement for production testing, but rather allows such testing to be conducted without a Surveyor being present.

Where conditions justify the need for increased surveillance, the PQA does not preclude the Surveyor in Charge from expanding the scope of surveillance. Where the situation (e.g., frequency of DBS Unit Certification, batch test results, etc.) warrants such action, DBS may require a closer interval of surveillance surveys. In such instances, the requirement for a renewal audit will be specially considered.

DBS also reserves the right to conduct unscheduled surveillance surveys.

Manufacturers receiving a Product Quality Assurance Certificate will be distinguished on DBS website by an added notation (PQA).

4.3.4 Certificates

4.3.4.1 Unit-Certification

When a Type Approved Product is proposed for use onboard a vessel or a marine structure, it is to fulfill all applicable requirements in the Rules, including given hereunder. Where required by DBS Rules, Unit Certification is also to be completed as follows:

a) *Products Covered by Product Quality Assurance.* Products requiring unit certification for use on a vessel, MODU, or facility classed with DBS will be unit-certified by DBS office having jurisdiction over the manufacturer. The manufacturer will be responsible to advise DBS office of deliveries of products and to supply DBS office with all documentation required for unit-certification of the product.
b) *Products Covered by Manufacturing Assessment.* Where the Rules require attendance of DBS Surveyor during any stage of manufacturing, including but not limited to any testing, the unit certification will be issued by the attending Surveyor upon completion of all required surveys and tests. Where the attendance of the Surveyor is not required by the Rules, no unit certification is required. At the discretion of the Surveyor, a unit-certification of this category may be credited to the annual audit, when conducted on or about its due date.

4.3.4.2 Issuance and Updating of Certificates

The certificates indicated in Design Assessment Certificate under paragraph 4.3.1 of this Section, Manufacturing Assessment Certificate (MA) under paragraph 4.3.2 and 4.3.3 of this Section will be issued initially for five years. These certificates are renewable for another five-year period (from the expiry date of the previous certificate), subject to assessment of design and manufacturing in accordance with Renewal as per paragraph 4.3.4 of this Section. Failure for renewal of the manufacturing assessment certificate will cease validation of type approval certification at the end of the five-year period. Where for a practical reason the renewal process of any certificate cannot be completed before expiry of the period, a short-term extension may be considered upon application. When the certificate is renewed within 90 days of its expiration date, the new certificate is to be valid from the expiration of the previous certificate.

These certificates will be updated in accordance with or, where the design, Rules or Regulations used for certification is changed during the five years period. The updated certificate will be issued for five years from the date of the updating. In addition, the following requirements will apply.

a) *Changes to Design, Procedures and Regulations other than DBS Rules.* At any time, where there is a change in the design, procedures or the applicable standards (other than DBS Rules), the manufacturer is to endeavor to

notify DBS of those changes with an application either for incorporation of the change for record purposes, or for re-assessment of the product, procedures and/or regulations, as the case may be. Failure to notify DBS about those changes may invalidate the certificate. Where a specific implementation date is indicated in the change(s) to the regulation adopted for the product, the certification will become invalid effective on the implementation date of the new regulation or the end of the five year period whichever comes first, unless the product is found or placed in compliance with the new requirement as a result of reassessment.

b) *Changes to DBS Rules.* The foregoing requirements on changes to other regulations will generally apply to the changes to DBS Rules shown on the Design Assessment Certificate. In this case, DBS is to endeavor to notify the manufacturer of the Rule changes, to call the attention of the manufacturer to the need for reassessment of the product design and manufacture and eventual updating as may be found necessary. The listing on DBS website will be replaced by the new listing upon completion of the updating, which is to be affected within the five year period shown on the certificate. Where a retroactive application of the change(s) to DBS Rules is required and their implementation date is specified, the certification will become invalid effective on the specified implementation date or the end of the five year period whichever comes first, unless the product is found or placed in compliance with the new requirement as a result of reassessment.

c) *Website Entry.* When the Product Type Approval becomes invalid due to overdue manufacturing audits, the products on DBS website will be relocated from the PTA index to the PDA index provided that the design assessment certification is still valid. When the design assessment certification is withdrawn or expired, all related entries on DBS website will be deleted at that point.

4.3.4.3 Acceptability of Type Approved Products

Unless a specific implementation date is indicated in the adopted Regulation or a retroactive application of the Rule change is required, a type approved product may be accepted for use on a vessel, MODU or facility classed or to be classed with DBS provided its type approval is valid at the time of the new construction contract of the vessel, MODU or facility.

If the implementation of change to Rules or Regulation is based on the keel laying date, then a type approved product with type approval valid at the time of keel laying of the vessel, MODU or facility will be acceptable.

4.3.4.4 Renewal

For renewal of certificates, the manufacturer is to inform DBS of any change to the product design, and the following are to be conducted, as appropriate:

a) Re-evaluate the product design in accordance with paragraph 4.3.1 of this Section, to update and verify if there is a design or specification change or a change to the applicable Rules or standards; and
b) Re-audit the quality plan in accordance with [Quality Control of 2.17.3.2 or 2.17.3.3]; and
c) Verify by survey that a valid quality assurance system has been maintained in accordance with Quality Assurance Standard of paragraphs 4.3.2 or 4.3.3 of this Section.

Where the manufacturer is on semi-annual or closer audit, the renewal audit for Manufacturing Assessment Certificate may be specially considered.

4.3.4.5 Overdue Audit

When a periodic (renewal, annual or closer) audit is not completed within 90 days after the anniversary date of the Manufacturing Assessment Certificate (for renewal or annual audit) or within 90 days after the due date (where a closer interval is specified), the entry in DBS website will be relocated from the PTA index to the PDA index if the PDA is still valid and, therefore, the Confirmation of Type Approval is deemed suspended.

4.3.5 Terms and Conditions of the Request for Product Type Approval and Agreement

4.3.5.1 Agreement

Unless otherwise agreed in writing, all services rendered and certificates issued are governed by the terms and conditions of the “Request for Product Type Approval and Agreement” (the “Agreement”) which are incorporated by reference. The Product Design Assessment of record will be the English version published on DBS website www.typeapproval.org. By requesting for Product Type Approval, the Customer gives his consent to be bound by terms and conditions and accepts that the details of the product, which may have commercial relevance will be published on DBS website and understands and agrees to the publishing.

4.3.5.2 Representation as to Product Type Approval

A Confirmation of Product Type Approval represents that the product design meets DBS Rules or Guides, statutory, industrial or manufacturer's standard described on the Design Assessment Certificate and that the manufacturer has established a systematic Quality Monitoring System to illustrate its capacity to constantly manufacture a product which meets the requisite standards. DBS is neither a substitute for the independent judgment of professional designers or engineers nor a substitute for the quality control procedures of constructors, makers, suppliers, manufacturers and vendors of marine structures, materials, machinery or equipment. DBS solely represents to the manufacturer or other Customer of DBS that it will use due diligence in developing Rules, Guides and standards in surveying the manufacturing facility or construction site as called for by DBS criteria for type approval.

4.3.5.3 Suspension of Certification

Any of the below mentioned events will cause instant suspension of the certificate of Product Type Approval unless the changes made are submitted to DBS for new review and audit.

Redesign of the product or products covered by a Design Assessment certificate;

a) change in production methods;
b) considerable change in management of the organization;
c) considerable change in frequency or curriculum for personnel training;
d) refusing access to DBS personnel for periodic or annual audits;
e) failure to take corrective measures against a non-compliance identified during an audit or in service;
f) failure to pay DBS fees.

4.3.5.4 Validity

The validity, applicability and interpretation of a certificate issued under the terms of or in contemplation of DBS Type Approval are governed by the Rules, Guides and standards of Dromon Bureau of Shipping which shall remain the sole judge thereof. Nothing contained in a Design Assessment or Manufacturing Assessment Certificate or in any report issued in contemplation of these certificates shall be deemed to relieve any designer, builder, owner, manufacturer, seller, supplier, repairer, operator or other entity of any warranty express or implied, nor create any interest, right, claim or benefit in any third party. It is understood and agreed that nothing expressed herein is intended or shall be construed to give any person, firm or corporation other than the parties hereto, any right, remedy, or claim hereunder or under any of the provisions herein contained; all of the provisions hereof are for the sole and exclusive benefit of the parties hereto.

4.3.5.5 Disagreement

For resolving any disagreement regarding either the proper interpretation of the Rules or translation of the Rules from the English language edition, they are to be referred to DBS.

4.3.5.6 Limitation

DBS makes no representations beyond those contained herein and in the provisions of the agreement regarding its reports, statements, plan review, surveys, certificates or other services.

4.3.5.7 Hold Harmless

The party to whom certificates are issued, and his assignee and successor in interest, agree to indemnify and hold harmless DBS from and against any and all claims, demands, lawsuits, or actions for damages, including legal fees, to persons or other legal entities and property, tangible, intangible, or otherwise which may be brought against DBS incidental to, arising out of or in connection with the work done, services performed or material to be furnished under DBS certificates, except for those claims caused solely and completely by the negligence of DBS, its agents, employees, officers, directors or subcontractors. Any other individual, corporation, partnership or other entity who is a party hereto or who in any way participates in, is engaged in connection with or is a beneficiary of, any portion of the services described herein shall also release DBS and shall indemnify and hold DBS harmless from and against all claims, demands, lawsuits or actions for damages, including legal fees, to persons and/or property, tangible, intangible or otherwise, which may be brought against DBS by any person or entity as a result of the services performed pursuant to this Agreement, except for those claims caused solely and completely by the negligence of DBS, its agents, employees, officers, directors or subcontractors.

4.3.5.8 Arbitration

Any and all differences and disputes of whatsoever nature arising out of this agreement shall be put to arbitration in the Limassol, Cyprus, pursuant to the laws relating to the arbitration there in force, before a board of three persons, consisting of one arbitrator to be appointed by DBS, one by Customer, and one by the two so chosen. The decision of any two of the three on any point or points shall be final. Until such time as the arbitrators finally close the hearings either party shall have the right by written notice served on the arbitrators and on an officer of the other party to specify further disputes or difference under this Agreement for hearing and determination. The arbitration is to be conducted in accordance with the rules of DBS of Maritime Arbitrators, Inc. in the English language. The governing law shall be the law of Limassol, Cyprus. The arbitrators may grant any relief which they, or a majority of them, deem just and equitable and within the scope of the agreement of the parties, including, but not limited to, specific performance. Awards made in pursuance to this clause may include costs including a reasonable allowance for attorney's fees and judgment may be entered upon any award made hereunder in any court having jurisdiction.

Customer shall be required to notify DBS within thirty (30) days of the commencement of any arbitration between it and third parties which may concern DBS's work in connection with this Agreement and shall afford DBS an opportunity, at DBS's sole option, to participate in the arbitration.

4.3.5.9 Time Bar to Legal Action

Any statutes of limitation notwithstanding, Customer expressly agrees for itself and its affiliated companies that its right to bring or to assert against DBS any and all claims, demands or proceedings whether in arbitration or otherwise shall be waived unless (a) notice is received by DBS within ninety (90) days after Customer or its affiliates had notice of or should reasonably have been expected to have had notice of the basis for such claims; and (b) arbitration or legal proceedings, if any, based on such claims or demands of whatever nature are commenced within one (1) year of the date of such notice to DBS.

4.3.5.10 Scope of Certification

Nothing contained in any certificate, design assessment, manufacturing assessment, confirmation of type approval, or report is to be deemed to relieve any designer, builder, owner, manufacturer, seller, supplier, repairer, operator, insurer or other entity or person of any duty to inspect or any other duty or warranty expressed or implied.

Any certificate, design assessment, manufacturing assessment, confirmation of type approval or report evidences only that at the time of the review or audit the material, component, product or system, or any other item covered by a certificate, design assessment, manufacturing assessment, or report complied with one or more of the Rules, Guides, standards or other criteria of Dromon Bureau of Shipping, or, where there is no DBS standard, complied with the industry or manufacturer's standard specified in the Type Approval listing on DBS Type Approval website.

Any listing or certificate is issued solely for the use of DBS, its committees, its Customers or other authorised entities.

Nothing contained in any listing, certificate, design assessment, manufacturing assessment, confirmation of type approval or report is to be deemed in any way a representation or statement beyond those contained in Representation as to Product Type Approval of paragraph 4.3.5 of this Section. DBS is not an insurer or guarantor of the integrity, safety or suitability of a vessel or of the material, components, products, systems, equipment, machinery and other items incorporated in it. The validity, applicability and interpretation of any certificate, report, plan or document review or approval are governed by the Rules, Guides, standards or other criteria of Dromon Bureau of Shipping who shall remain the sole judge thereof. DBS is not responsible for the consequences arising from the use by other parties of the Rules, Guides, standards or other criteria of Dromon Bureau of Shipping, without review, plan approval and survey by DBS. The term "approved" shall be interpreted to mean that the plans, reports or documents have been reviewed for compliance with one or more of the Rules, Guides, standards or other criteria acceptable to DBS.

Section 5 – Procedure for Transfer of Class

5.1 General

5.1.1 This Section contains procedures and requirements pertaining to transfer of class from one Society (i.e. losing Society) to another Society (i.e. gaining Society) and is applicable, unless stated otherwise, to vessels of whatever type, self-propelled or not, restricted or unrestricted service, except for "inland waterway" vessels.

5.1.2 The obligations of DBS and losing Societies continue to apply when a vessel's class is suspended and for six (6) months following withdrawal of a vessel's class, irrespective of class status in the meantime.

5.1.3 As the ship, may be laid up, DBS is to check the classification status from the previous Society to verify if the requirements of this Section are applicable.

5.2 Definitions

At vessel's delivery	means that the new construction survey process is completed, the first Certificate of Class is delivered and the vessel has not departed from the yard.
First Certificate of Class	means either Interim Certificate of Class or Full Term Certificate of Class or another Certificate serving the same purpose.
Gaining Society	means a Classification Society which accepts a vessel for its classification only after all overdue surveys; overdue recommendations or overdue conditions of class previously issued against the vessel have been completed by or as specified by the losing Society.
Interim Certificate of Class	or Interim Class Certificate, is the certificate issued immediately upon completion of the survey of the vessel to enable it to trade while the report of the classification surveys is processed by the gaining Society pursuant to issuing its full-term Class Certificate.
Losing Society	means the Classification Society from which class is being transferred. In the case of vessels classed by more than one Society, 'losing Society' means all Classification Societies from which class is being transferred.
Outstanding	means still to be dealt with.
Overdue	means overdue on the date the losing Society receives the request by the gaining Society for its current classification survey status.
Recommendations' and 'Conditions of Class	are to be read throughout this Procedural Requirement as being different terms used by Societies for the same thing, i.e. requirements to the effect that specific measures, repairs, surveys etc. are to be carried out within a specific time limit to retain class.

5.3 Obligations and reporting of DBS

5.3.1 Whenever DBS is requested by an Owner to accept an existing vessel into class, DBS will notify the Owner in writing that:

5.3.1.1 the relevant surveys specified in paragraph 5.5.2 of this Section are required to be satisfactorily completed for entry into class;

5.3.1.2 for vessels less than 15 years of age (calculated from the date of delivery to the "Date Request for Class was Received"), an Interim Certificate of Class can be issued only after the gaining Society has completed:
(i) all overdue surveys; and
(ii) all overdue recommendations / conditions of class previously issued against the vessel as specified to the Owner by the losing Society;

5.3.1.3 for vessels 15 years of age and over, an Interim Certificate of Class can be issued only after the losing Society has completed:
(i) all overdue surveys; and
(ii) all overdue recommendations / conditions of class previously issued against the vessel.

5.3.1.4 any outstanding recommendations / conditions of class are to be dealt with by their due dates;

5.3.1.5 the principles given in items 5.3.1.1. to 5.3.1.3 above apply to any additional recommendations / conditions of class issued against the vessel arising from surveys which were not included in the initial survey status provided to the gaining Society by the losing Society because the surveys were carried out in close proximity to the request for transfer of class. Such additional recommendations / conditions of class if received after the issuance of the Interim Certificate of Class by the gaining Society and which are overdue are to be dealt with at the first port of call by the relevant Society depending on the age of the vessel;

5.3.1.6 copies of the plans listed in paragraph 5.6 of this Section are to be provided to the gaining Society as a prerequisite to obtaining a full-term Class Certificate.

If the Owner is unable to provide all the required plans, DBS is to request that the Owner authorise the losing Society to transfer copies of such of these plans as it may possess directly to the gaining Society upon request from the gaining Society, with the advice that the losing Society will invoice the gaining Society and the gaining Society may, in turn, charge the associated costs to the Owner.

5.3.2 Prior to issuing an Interim Certificate of Class DBS is to obtain:

5.3.2.1 from the Owner, a written request for transfer of class, containing an authorisation for DBS to obtain the current classification status from the losing Society; and

5.3.2.2 the current classification survey status from the losing Society or one of its designated control or management centers.

5.3.3 Within two (2) working days of receipt of a written request from the Owner for transfer of class at DBS Head Office, is to notify the losing Society of the requested transfer of class with the Owner's authorisation for release of the survey status. If DBS does not receive the classification survey status from the losing Society within three (3) working days from request, DBS may utilize the losing Society's survey status information provided by the Owner and, after complying with the other relevant requirements of this Procedural Requirement, may issue an Interim Certificate of Class. In such cases, a statement is to be included in or with the Interim Certificate of Class reminding the Owner that the conditions of paragraph 5.3.1 of this Section are still applicable.

5.3.4 DBS is not to issue an Interim Certificate of Class, or other documents enabling the vessel to trade:

5.3.4.1 In case the ship has been declassed or is changing class for safety reasons, before giving the opportunity to the competent Administration of the flag State to give its opinion within a reasonable time as to whether a full inspection is necessary.

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

5.3.4.3 Until all relevant surveys specified in paragraph 5.5.2 of this Section have been satisfactorily completed; when facilities are not available in the first port of survey, an Interim Certificate of Class may be issued to allow the vessel to undertake a direct voyage to a port where facilities are available to complete surveys required in paragraph 5.5.2 of this Section. In such cases the surveys specified in paragraph 5.5.2 of this Section are to be carried out to the maximum extent practicable at the first port of survey, but in no case less than the scope of annual hull survey and machinery surveys as required in paragraph 5.5.2 of this Section;

5.3.4.4 before giving the opportunity to the Flag Administration to provide any further instructions within three (3) working days.

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

5.3.5.1 Interim Certificate of Class or an attachment to the Interim Certificate of Class, and/or class survey record available on board; and

5.3.5.2 survey status when the full-term Class Certificate is issued.

DBS will, within one (1) month from issuing its Interim Certificate of Class, to advise the losing Society of the date of issuing this certificate and confirm the date, location and action taken to satisfy each overdue survey and overdue recommendation / condition of class, if any, issued against the subject vessel as specified to the Owner by the losing Society.

5.3.6 Any additional information regarding outstanding surveys or recommendations / conditions of class received from the losing Society is to be dealt with in accordance with paragraphs 5.3.4 and 5.3.5 of this Section, as applicable, and reported to the losing Society within one (1) month from the completion of the survey. If this additional information is received after the Interim Certificate of Class has been issued, any surveys or recommendations / conditions of class which are overdue are to be dealt with at the first port of call:

5.3.6.1 by the gaining Society in vessels less than 15 years of age; or

5.3.6.2 by the losing Society in vessels 15 years of age or over.

If this is not accomplished, the Interim Certificate of Class is to be withdrawn immediately unless the Owner agrees to proceed directly, without further trading, to a suitable port where any overdue surveys or overdue recommendations / conditions of class are to be carried out by the relevant Society based on the age of the vessel.

5.3.7 Prior to final entry into class the gaining Society's obligation is:

5.3.7.1 to carry out and document the review, of class survey records, of the losing Society, by an authorized person.

5.3.7.2 to advise the losing Society in writing of the anticipated date of final entry into class.

5.3.8 DBS may, if deemed necessary, carry out the review of class survey records of other Societies, which had previously classed the vessel.

5.3.9 DBS is to confirm in writing the date of final entry into class to the flag State within one (1) month of the date of final entry into class.

5.4 Transfer of class at vessel's delivery

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

5.4.2 Whenever DBS is requested by an Owner to accept a vessel into class at its delivery, DBS will immediately notify the Owner in writing that:

5.4.2.1 any outstanding recommendations / conditions of class are to be dealt with by their due dates;

5.4.2.2 copies of the plans listed in paragraph 5.6 of this Section are to be provided to DBS as a prerequisite to obtaining a Full-Term Certificate of Class.

If the Owner is unable to provide all of the required plans, DBS will request that the Owner authorise the losing Society to transfer copies of such of these plans as it may possess directly to the gaining Society upon request from the gaining Society, with the advice that the losing Society will invoice the gaining Society and the gaining Society may, in turn, charge the associated costs to the Owner.

5.4.3 Prior to issuing an Interim Certificate of Class on the date of the vessel's delivery, DBS is to obtain:

5.4.3.1 from the Owner, a written request for transfer of class at vessel's delivery, containing an authorisation for the gaining Society to obtain a copy of the first Certificate of Class, from the losing Society; and

5.4.3.2 the first Certificate of Class from the losing Society or one of its designated control or management centers or from the attending Surveyor at the yard of the builder including any outstanding recommendations / conditions of class and information normally contained in the classification status.

5.4.4 After receipt of a written request from the Owner for transfer of class at DBS, is to notify the losing Society of the requested transfer of class with the Owner's authorisation for release of the first Certificate of Class, including the list of any recommendations / conditions of class - with the respective due dates - issued against the subject vessel and information normally contained in the classification status.

5.4.5 If DBS does not receive the above documents from the losing Society on the date of the vessel's delivery, DBS may utilise the losing Society's said documents provided by the Owner and, after complying with the other relevant requirements of this Section, may issue an Interim Certificate of Class on the date of the vessel's delivery.

5.4.6 DBS is not to issue an Interim Certificate of Class, or other documents enabling the vessel to trade:

5.4.6.1 until all relevant surveys specified in paragraph 5.5.2 of this Section have been satisfactorily completed; and

5.4.6.2 before giving the opportunity to the Flag Administration to provide any further instruction within three (3) working days.

5.4.7 The validity of the Interim Certificate of Class and the subsequent full term Certificate of Class issued by DBS is subject to any outstanding recommendations / conditions of class previously issued against the vessel being completed by the due date and as specified by the losing Society. Any outstanding recommendations / conditions of class with their due dates and information normally contained in the classification status are to be clearly stated on the:

5.4.7.1 First Certificate of Class or an attachment to the First Certificate of Class and/or class survey record available onboard.

5.4.7.2 Survey status when the full-term Certificate of Class is issued.

5.4.8 DBS is, within one (1) month from issuing its Interim Certificate of Class, to advise the losing Society of the date of issuing this certificate.

5.4.9 In cases where the losing Society has reported recommendations / conditions of class on the vessel, DBS is to provide to the losing Society, an itemized list of actions taken with the date and location and actions to be taken, to satisfy each recommendation / condition of class.

5.5 Technical requirements

5.5.1 Plans and information

DBS in case of being the gaining Society is to request copies of plans showing the main scantlings and arrangements of the actual vessels and machinery, together with any proposals for alterations being dealt with, from the Owner. Receipt of plans listed in paragraph 5.6 of this Section, or equivalent, alternative technical data in lieu of specific plans or items, is to be identified to the Owner as a prerequisite to issuance of a full-term Class Certificate by DBS. However, having made a good faith effort to obtain the information, if it proves not practicable to acquire certain plans as listed in paragraph 5.6 of this Section, or equivalent, alternative technical data, DBS may issue the full-term Class Certificate if its classification records document that the vessel is being accepted into class on the basis of a recorded internal review of the circumstances prevailing with respect to availability of plans.

5.5.2 Class Entry Surveys

Notwithstanding the records indicating that all surveys are up-to-date, a class entry survey is to be held by DBS in case of being the gaining Society, the minimum extent of which is to be based on the age of the vessel and the losing Society's class status as follows:

5.5.2.1 Hull Class Entry Survey:

i. for vessels of age less than 5 years the survey is to take the form of an Annual Survey;
ii. for vessels between 5 and 10 years of age the survey is to include an Annual Survey and inspection of a representative number of ballast spaces;
iii. for vessels of 10 years of age and above but less than 20 years of age, the survey is to include an Annual Survey and inspection of a representative number of ballast spaces and cargo spaces. For gas carriers, in lieu of internal inspection of cargo spaces, the following applies:
    - Inspection of representative spaces surrounding cargo tanks, including external inspection of the tank and its supporting systems as far as possible;
    - Review of cargo log books and operational records to verify the correct functioning of the cargo containment system.
iv. for vessels which are 15 years of age and above but less than 20 years of age, the survey is to have the scope of a Special Survey or an Intermediate Survey, whichever is due next;
v. for all vessels, which are 20 years of age and above, the survey is to have the scope of a Special Survey;
vi. in lieu of the above i to v requirements the following apply for site specific purpose-built Floating Production and/or Storage Vessels:
    - for vessels of age less than 5 years, the survey is to have the scope of an Annual Survey;
    - for vessels of age between 5 and 10 years, the survey is to include an Annual Survey and inspection of twenty percent of ballast spaces;
    - for vessels of age between 10 and 20 years, the survey is to include an Annual Survey and inspection of twenty percent of ballast spaces and twenty percent of cargo spaces.
    - for vessels over 20 years of age, the survey is to have the scope of a Special Survey.
vii. for site specific Floating Production and/or Storage Vessels which have been converted from other vessels, the survey is to take the form of an Annual Survey and also include inspection of twenty percent of ballast spaces and twenty percent of cargo spaces until 20 years have elapsed since conversion. After 20 years the survey is to have the scope of a Special Survey.
viii. in the context of applying items iv and v above, if a dry-docking of the vessel is not due at the time of transfer, consideration can be given to carrying out an underwater examination in lieu of dry-docking.
ix. in the context of applying items iv and v, as applicable, the anchors and anchor chain cables ranging and gauging for vessels over 15 years of age is not required to be carried out as part of the class entry survey unless the class entry survey is being credited as a periodical survey for maintenance of class. If the class entry survey is to be credited as a periodical survey for maintenance of class, consideration may be given by the gaining society to the

acceptance of the anchors and anchor chain cables ranging and gauging carried out by the losing society provided they were carried out within the applicable survey window of the periodical survey in question.

x. in the context of applying items i to viii above, as applicable,
   - if the class entry survey is to be credited as a periodical survey for maintenance of class consideration may be given by the gaining society to the acceptance of thickness measurements taken by the losing society provided they were carried out within the applicable survey window of the periodical survey in question.
   - if the class entry survey is not to be credited as a periodical survey for maintenance of class, consideration may be given by DBS to the acceptance of thickness measurements taken by the losing society provided they were carried out within 15 months prior to completion of class entry survey when it is in the scope of a Special Survey, within 18 months prior to completion of class entry survey when it is in the scope of an Intermediate Survey.
     In both cases, the thickness measurements are to be reviewed by the gaining society for compliance with the applicable survey requirements, and confirmatory gauging are to be taken to the satisfaction of the gaining society.

xi. In the context of applying iii to viii above, as applicable, tank testing for vessels over 15 years of age is not required to be carried out as part of the class entry survey unless the class entry survey is being credited as a periodical survey for maintenance of class. If the class entry survey is to be credited as a periodical survey for maintenance of class, consideration may be given by the gaining society to the acceptance of the tank testing carried out by the losing society provided they were carried out within the applicable survey window of the periodical survey in question.

5.5.2.2 Machinery Class Entry Survey, a general examination of all essential machinery is to be held and is to include:

i. examination under working conditions of oil fuel burning equipment of boiler, economisers and steam/steam generators. The adjustment of safety valves of this equipment is to be verified by checking the records on the vessel;
ii. all pressure vessels;
iii. insulation resistance, generator circuit breakers, preference tripping relays and generator prime mover governors are to be tested and paralleling and load sharing to be proved;
iv. in all cases, navigating lights and indicators are to be examined and their working and alternative sources of power verified;
v. bilge pumps, emergency fire pumps and remote control for oil valves, oil fuel pumps, lubricating oil pumps and forced draught fans are to be examined under working conditions;
vi. recirculating and ice clearing arrangements, if any;
vii. the main and all auxiliary machinery necessary for operation of the vessel at sea together with essential controls and steering gear is to be tested under working conditions. Alternative means of steering are to be tested. A short sea trial is to be held at the Surveyors discretion if the vessel has been laid up for a long period;
viii. initial start arrangements are to be verified;
ix. in the case of oil tankers, the cargo oil system and electrical installation in way of hazardous spaces are to be checked for compliance with DBS Rules. Where intrinsically safe equipment is installed, DBS Surveyors are to satisfy themselves that a recognised authority has approved such equipment. The safety devices, alarms and essential instruments of the inert gas system are to be verified and the plant generally examined to ensure that it does not constitute a hazard to the vessel.

Note: For the transfer of class or adding class at ship's delivery, items iii) and ix) may be verified by reviewing the ship's record.

5.6 Plans to be submitted by the Owner to the Gaining Society

5.6.1 Plans to be submitted

5.6.1.1 Main Plans
- General Arrangement
- Capacity Plan
- Hydrostatic Curves
- Loading Manual, where required.
- Damage Stability calculation, where required.

5.6.1.2 Steel plans
- Midship Section and other Sections
- Scantling Plan
- Shell expansion
- Transverse Bulkead
- Decks and Tank Top
- Hatch Covers, if applicable
- Rudder, Rudder Stock and Pintle, if applicable
- For CSR vessels, plans showing, for each structural element, both as-built and renewal thicknesses and any thickness for "voluntary addition".

5.6.1.3 Machinery plans
- Machinery Arrangement
- Intermediate, Thrust and Screw Shafts
- Propeller
- Main Engines, Propulsion Gears and Clutch Systems (or Manufacturer make, model and rating information
- For Steam Turbine Vessels, Main Boilers, Superheaters & Economisers (or Manufacture make, model and rating information) and Steam Piping
- Bilge and Ballast Piping Diagram
- Wiring Diagram
- Steering Gear Systems Piping and Arrangements & Steering Gear Manufacturer make and model information

5.6.2 Torsional vibration calculations
- Torsional Vibration Calculation (applicable for vessels less that have their keel laid on or after 1 January 2009)

5.6.2 Additional requirements for vessels with ice class notation
- Flexible Couplings and/or Torque Limiting Shafting Devices in the Propulsion Line Shafting (or Manufacturer make, model and rating information)
- Draft in Fully Loaded and Ballast Condition at Fore and Aft Perpendicular

5.6.3 Additional plans required for oil tankers
- Pumping arrangement at the forward and after ends and drainage of cofferdams and pump rooms are to be submitted.

5.6.4 Additional plans required for unattended machinery space notation
- Instrument and Alarm List
- Fire Alarm System
- List of Automatic Safety Functions (e.g. slowdowns, shutdowns, etc.)
- Function Testing Plan.

5.6.5.1 Additional Documents required for approval of Alternative Design and Arrangements
- Document(s) of Approval of Alternative Design and Arrangements are to be submitted, if any.

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Any comments may be send by email to *class.rules@dromon.com*

Rules for the classification and construction of sea-going vessels

Part 1 – Classification Regulations and Surveys

Chapter 2 – Inspection techniques

01/07/2018
Revision: 1

Revision History

Revision no.	Effective Date	Revision Summary
1	01/07/2018	The revision of this Part is based on: ▪ IACS Unified Requirements: UR Z17 (June 2015), ▪ IACS Procedural Requirements: PR1C (January 2016) and PR1A (January 2016). ▪ IACS Recommendation No.20 (December 2007); No.69 (May 2004); No.68 (June 2000); No.42 (June 2016) Editorial changes have been carried out.
Initial	01/01/2015	Initial issue

Table of content

Section 1 – General requirements for inspection techniques 4
1.1 General 4
1.2 Qualification of personnel 4
1.3 General NDT approach 4
1.4 Reporting 5
Section 2 – NDE techniques 6
2.1 General 6
2.2 Visual Examination (VE) 6
2.3 Magnetic Particle Examination (ME) 6
2.4 Liquid Penetrant Examination (PE) 6
2.5 Ultrasonic Examination (UE) 6
2.6 Radiographic Examination (RE) 7
2.7 Acceptance Criteria 8
Section 3 – NDT examination for ship hull steel welds 10
3.1 Application requirements 10
3.2 Applicability of NDT methods 10
3.3 General NDT approach 10
3.4 Acceptance criteria and non-conforming weldments 11
3.5 Unacceptable indications and repairs 11
Section 4 – Guidelines for inspections using NDE Techniques 12
4.1 Application requirements 12
4.2 Applicability of NDT methods 12
4.3 Extent of Examination 12
4.4 Examination Procedures 13
Section 5 – NDT examination of hull and machinery steel forgings 19
5.1 Application requirements 19
5.2 Applicability of NDE methods 19
5.3 Acceptance criteria for Visual Testing 20
5.4 Acceptance criteria for Magnetic Particle Testing and Liquid Penetrant Testing 20
5.5 Rectification of Defects 21
5.6 Acceptance criteria for ultrasonic testing 21
Section 6 – Use of remote inspection techniques for surveys 27
6.1 General requirements 27
6.2 Implementation of a remote inspection technique 27

Section 1 – General requirements for inspection techniques

1.1 General

1.1.1 Current chapter refers to the requirements for inspection techniques of surveys including non-destructive techniques (NDT) and remote inspection techniques as well.

1.1.2 Concerning the NDT methods the current chapter contains the minimum requirements on the methods and quality levels that may be adopted for the non-destructive testing (NDT) of ship hull steel welds, marine steel casting and hull and machinery steel forging during inspections, new building, and ship repair. Notwithstanding, the quality levels refer to production quality and not to fitness-for-purpose of the welds examined.

1.1.3 DBS surveyor may require witnessing some testing to ensure that these requirements conduct NDT.

1.1.4 Testing specifications and procedures should be adhered to during the construction, and the report must be made available to DBS surveyor on the findings made by the NDT.

1.1.5 DBS surveyor determines the extent of testing and the number of checkpoints.

1.1.6 Concerning the remote inspection techniques the current chapter refers to the below-mentioned techniques:
- Divers
- Unmanned robot arm
- Remote Operated Vehicles (ROV)
- Climbers
- Drones
- Other means acceptable to DBS.

1.1.7 The methods applied for remote inspection technique are to provide the survey results normally obtained for/by the Surveyor.

1.2 Qualification of personnel

1.2.1 For each inspection method, operators should be qualified according to a nationally recognized scheme with a grade equivalent to level II qualification of ISO 9712, SNT-TC-1A, EN 473 or ASNT Central Certification Program (ACCP). Operators qualified to level I may be engaged in the tests under the supervision of personnel qualified to level II or III.

1.2.2 Personnel responsible for the preparation and approval of NDT procedures should be qualified according to a nationally recognized scheme with a grade equivalent to level III qualification of ISO 9712, SNT-TC-1A, EN 473 or ASNT Central Certification Program (ACCP).

1.2.3 Personnel engaged in the visual examination is to have sufficient knowledge and experience. Personnel engaged in magnetic particle testing, or liquid penetrant testing is to be qualified by DBS Rules.

1.2.4 Certification should verify personnel qualifications.

1.3 General NDT approach

1.3.1 The Shipbuilder should plan the extent of testing according to the ship design, ship type and welding processes used. Particular attention should be paid to highly stressed areas.

1.3.2 For each construction, the Shipbuilder should submit a plan for approval by DBS, specify the areas to be examined and the extent of testing concerning the NDT procedures to be used. The plan should only be released to the personnel in charge of the NDT and its supervision.

1.3.3 The identification system should identify the exact locations of the lengths of weld examined.

1.3.4 All welds should be subject to visual testing by personnel designated by the Shipyard.

1.3.5 As far as practicable, magnetic particle testing should be preferred over liquid penetrant testing and should cover a minimum weld length of 500mm.

1.3.6 Welded connections of a large cast or forged components (stern frame, stern boss, rudder parts, shaft brackets...) should be tested over their full length using MT or PT and at agreed locations using RT or UT.

1.3.7 As given in Table 1 below, UT or RT or a combination of UT and RT can be used for testing of butt welds with full penetration of 10mm thickness or greater. Methods to be used should be agreed with DBS.

1.3.8 Everyone start/stop point in welds made using automatic (mechanized) welding processes should be examined using RT or UT except for internal members where the extent of testing should be agreed.

1.3.9 Within the agreed NDT plan, the minimum RT test length should be 300mm and the minimum UT test length should be 500mm.

1.4 Reporting

1.4.1 Reports of non-destructive testing required should be prepared by the Shipbuilder and should be made available to DBS.

1.4.2 Reports of non-destructive testing should include the following generic items:
- date of testing
- names, qualification level and signature of personnel that has performed the testing
- identification of the component examined
- identification of the welds examined
- steel grade, type of joint, thickness of parent material, welding process
- acceptance criteria
- testing standards used
- testing equipment and arrangement used
- any test limitations, viewing conditions and temperature
- results of testing concerning acceptance criteria, location and size of reportable indications
- statement of acceptance / non-acceptance
- number of repairs if specific area repaired more than twice

1.4.3 In addition to generic items, reports of liquid penetrant testing should include the following specific items:
- type of penetrant, cleaner and developer used
- penetration time and development time

1.4.4 In addition to generic items, reports of magnetic particle testing should include the following specific items:
- type of magnetization
- the magnetic field strength
- detection media
- viewing conditions
- demagnetization, if required

1.4.5 In addition to generic items, reports of radiographic testing should include the following specific items:
- type and size of the radiation source
- type of film
- type of intensifying screens
- exposure technique, time of exposure and source-to-film distance
- sensitivity, type, and position of IQI
- density
- geometric unsharpness

1.4.6 Reports of ultrasonic testing should include the following specific items:
- type and identification of ultrasonic equipment used, probes and couplant
- sensitivity levels calibrated and applied for each probe
- transfer loss correction applied
- type of reference blocks
- a signal response used for defect detection

Section 2 – NDE techniques

2.1 General

2.1.1 The testing method, equipment and conditions should comply with recognized National or International standards, or other documents to the satisfaction of DBS.

2.1.2 Sufficient details including but not limited to surface requirements, such as cleaning and preparation, location reference such as identification and marking, evaluation of findings, indications and reporting, should be given in a written procedure for each NDT technique submitted to DBS for acceptance.

2.1.3 The methods mentioned in this document for detection of conducting NDT inspection are visual testing (VT), liquid penetrant testing (PT) and magnetic particle testing (MT). The methods mentioned for detection of internal imperfections are ultrasonic testing (UT) and radiographic testing (RT).

2.2 Visual Examination (VE)

2.2.1 It is required for the direct visual examination that there is adequate illumination at the weldment being examined so that the unacceptable surface discontinuities are easily revealed. The welds should be presented in clean, dry and free of paint.

2.3 Magnetic Particle Examination (ME)

2.3.1 The procedure should detail as a minimum the surface preparation, magnetizing equipment, calibration methods, detection media and application, viewing conditions and post demagnetization.

2.3.1 The surface to be examined should be free from scale, weld spatter, oil, grease, dirt or paint and should be clean and dry.

2.3.2 When using current flow equipment with prods, care shall be taken to avoid local damage to the material. Copper prod tips must not be used. The prod tips should be lead, steel, aluminum or aluminum-copper braid.

2.3.3 To ensure detection of discontinuities of any orientation, the welds are magnetized in two directions approximately perpendicular to each other with a maximum deviation of 30°. Adequate overlapping shall ensure testing of the whole zone.

2.3.4 Continuous wet particle method should be used as far as practicable.

2.4 Liquid Penetrant Examination (PE)

2.4.1 The procedure should detail as a minimum the calibration equipment, surface preparation, cleaning and drying prior to testing, temperature range, type of penetrant, cleaner and developer used, penetrant application and removal, penetration time, developer application and development time and lighting conditions during testing.

2.4.2 The surface to be examined should be clean and free from scale, oil, grease, dirt or paint and should include the weld bead and base metal for at least 10mm on each side of the weld, or the width of the heat affected zone, whichever is greater.

2.4.3 The temperature of parts examined should be typically between 5°C and 50°C, outside this temperature range special low/high temperature penetrant and reference comparator blocks should be used.

2.4.4 The penetration time should not be less than 10 minutes and in accordance with the manufacturer's specification. The development time should not be less than 10 minutes and in accordance with the manufacturer's specification, normally between 10-30 minutes.

2.5 Ultrasonic Examination (UE)

2.5.1 The procedure should detail the equipment, type of probes (frequency, angle of incidence), coupling media, type of reference blocks, method for range and sensitivity setting, method for transfer corrections, scanning technique, sizing technique and intervals for calibration checks during testing.

2.5.2 The equipment (instrument and probes) should be verified by the use of appropriate standard calibration blocks at suitable time intervals.

2.5.3 The range and sensitivity should be set prior to each testing and checked at regular intervals as per the procedure and whenever needed.

2.5.4 The scanning surfaces should be sufficiently clean and free from irregularities like rust, loose scale, paint (excluding primer), weld spatter or grooves which may interfere with probe coupling.

2.5.5 The surface profile should be such to avoid loss of probe contact by rocking.

2.5.6 The scanning technique should be determined to allow the testing of the entire volume of the weld bead and base metal for at least 10mm on each side of the weld, or the width of the heat affected zone, whichever is greater.

2.5.7 The probe frequency should be within the range 2 MHz to 5 MHz.

2.5.8 The reference level for testing should be set using a Distance-Amplitude-Corrected curve (DAC curve) for a series of 3mm diameter rilled holes in a reference block or other methods like the Distance-Gain-Size (DGS) system based on a disc shaped reflector provided the same sensitivity is achieved. The reference block used should be made in a material giving equivalent ultrasonic response to that of the material to be tested.

2.5.9 The indications with an echo height below 33% of DAC curve (DAC minus 10 dB) should be disregarded. The indications with an echo height equal to or exceeding 33% of DAC curve (DAC minus 10 dB) should be evaluated.

2.5.10 Base material in the scanning zone should be examined with a straight beam technique to check the absence of imperfections which would interfere with the angle beam technique, unless already demonstrated at a previous fabrication stage.

2.5.11 Angle beam technique should be used to search for longitudinal and transverse weld discontinuities. An angle probe with an incident angle of the sound wave equal to that of the weld preparation should be used as a minimum.

2.6 Radiographic Examination (RE)

2.6.1 The procedure should detail as a minimum the type of radiation source, considering the thickness to be radiographed, test arrangement and films overlapping, type and position of image quality indicators (IQI), image quality, film system and intensifying screens used if any, exposure conditions, scattered radiation control, film processing, film density and viewing conditions.

2.6.2 Processed films should display hull no., frame no., weld boundary indicators, Port/Starboard, location (or film serial number) and date as radiographic image.

2.6.3 DBS may require to duplicate some radiographs in order that some processed films are handed over to DBS together with testing reports. Alternative method to duplicate the processed film can be agreed with DBS.

2.6.4 The type of source is selected by the shipbuilder in accordance with item 7.2 of ISO 17636.

2.6.5 Single-wall exposure technique should be used as far as practicable.

2.6.6 The image quality should be verified using an IQI (Image Quality Indicator) in accordance with ISO 19232 or equivalent. In general, the IQI is to be placed on the source side of the weld examined. The minimum image quality should be in accordance with Class A of ISO 17636 or equivalent, as given in Table 1 for IQI's of wire type placed on source side.

2.6.7 When using IQI's of wire type, the image of a wire is considered visible on the film if a continuous length of at least 10mm is clearly visible in a section of uniform optical density.

2.6.8 The optical density of the radiographs should be selected by the shipbuilder in accordance with Table 5 of ISO 17636.

2.6.9 Traditional radiographic film may be replaced by digital radiographic techniques where it can be shown, to the satisfaction of DBS, that the sensitivity of the digital image is better than or equal to the image obtained with traditional radiographic film.

NOMINAL THICKNESS RANGE	WIRE NUMBER* VISIBLE ON THE FILM (NOMINAL DIAMETER) * When using Iridium 192 sources, lower values can be accepted: • up to 2 values for 10mm < t < 24mm • up to one value for 24mm < t < 30mm
5mm < t < 7mm	W14 (0.16mm)
7mm < t < 10mm	W13 (0.20mm)
10mm < t < 15mm	W12 (0.25mm)
15mm < t < 25mm	W11 (0.32mm)
25mm < t < 32mm	W10 (0.40mm)
32mm < t < 40mm	W9 (0.50mm)
40mm < t < 55mm	W8 (0.63mm)
55mm < t < 85mm	W7 (0.80mm)
85mm < t < 150mm	W6 (1.0mm)

Table 1 - Minimum image quality using IQI wire type placed on source side with single wall technique

2.7 Acceptance Criteria

2.7.1 Testing techniques should be combined to facilitate the assessment of indications against the acceptance criteria. The assessment of indications not covered by this document should be made in accordance with a standard agreed with DBS.

2.7.2 For the Visual Examination (VT) the acceptance criteria are given in Table 2 below.

Surface Discontinuity	Classification according to ISO 6520-1	Acceptance criteria for Visual Examination
Crack	100	not accepted
Lack of fusion	401	not accepted
Incomplete root penetration in butt joints welded from one side	4021	not accepted
Surface pore	2017	Single pore diameter d < 0.25t for butt welds (d < 0.25a for fillet welds) with maximum diameter 3mm; 2.5d as minimum distance to adjacent pore. "t" is the plate thickness of the thinnest plate and "a" is the throat of the fillet weld.
Undercut in butt welds	501	depth < 0.5mm whatever is the length depth < 0.8mm with a max continuous length of 90mm Adjacent undercuts separated by a distance shorter than the shortest undercut should be regarded as a single continuous undercut.
Undercut in fillet welds	501	depth < 0.8mm whatever is the length

Table 2: Acceptance criteria for visual testing, magnetic particle and liquid Penetrant Examination

2.7.3 For the Liquid Penetrant Examination (PE) and Magnetic Particle Examination (ME) the following should be taken into account:

2.7.3.1 Only the indications which have any dimension greater than 2mm should require evaluation

2.7.3.2 Welds examined using liquid penetrant or magnetic particle technique should be evaluated on the basis of the criteria for visual testing.

2.7.4 For the Radiographic Examination (RT) the acceptance criteria are given in Table 3.

2.7.4.1 When discontinuities like undercut or incomplete filled groove are detected on a radiograph, additional examination is recommended to state their acceptance. Criteria for visual examination apply.

Discontinuity	Classification according to ISO 6520-1	Acceptance criteria for Radiographic Examination (RE) "t" is the plate thickness of the thinnest plate
Crack	100	not accepted

Lack of fusion	401	Continuous* maximum length t/2 or 25mm whichever is the less intermittent cumulative** length maximum t or 50mm
Incomplete root penetration	4021	not accepted in butt joint welded from one side
		Continuous* max length t/2 or 25mm whichever is the less intermittent cumulative** length max t or 50mm
Slag inclusion	301	Continuous* max length t or 50mm whichever is the less intermittent cumulative*** length max 2t or 100mm
Notes: *Two adjacent individual discontinuities of length L1 and L2 situated on a line and where the distance L between them is shorter than the shortest discontinuity should be regarded as a continuous discontinuity of length L1+L+L2 ** Sum of the length of individual continuous discontinuities. *** Sum of the length of individual continuous discontinuities and Parallel inclusions not separated by more than 3 times the width of the largest inclusion should be regarded as one continuous discontinuity.		

Table 3 - Acceptance criteria for Radiographic examination

2.7.5 For the **Ultrasonic examination** (the acceptance criteria are given in Table 4. The length of the indication should be determined using a suitable technique (like 6dB drop tip location technique).

Echo height	**Acceptance criteria for Ultrasonic Examination** Two adjacent individual discontinuities of length L1 and L2 situated on a line and where the distance L between them is shorter than the shortest discontinuity should be regarded as a continuous discontinuity of length L1+L+L2
Greater than 100% of DAC curve	maximum length t/2 or 25mm whichever is the less
Greater than 50% of DAC curve but less than 100% of DAC curve	maximum length t or 50mm whichever is the less
Indications evaluated to be cracks are unacceptable regardless of echo height; Indications evaluated to be lack of penetration in joints welded from one side are unacceptable regardless of echo height.	

Table 4 - Acceptance criteria for Ultrasonic Examination (UE)

Section 3 – NDT examination for ship hull steel welds

3.1 Application requirements

3.1.1 With respect to the materials these rules are applied to fusion welds made in:

1. normal and higher strength hull structural steels in accordance with IACS UR W11:
   - For steel plates and wide flats, all Grades, up to 100mm in thickness,
   - For sections and bars all Grades, Up to 50mm in thickness,
   - For greater thickness certain variations in the requirements may be allowed or required in particular cases after consideration of the technical circumstances involved.
2. high strength quenched and tempered steels in accordance with IACS UR W16. The steels covered by the scope of these requirements are specified in yield strength levels of 420, 460, 500, 550, 620, 690, 890 and 960 N/mm^2. For each yield strength level grades, A, D, E and F are specified, based on the impact test temperature, except for yield strength level of 890 and 960 N/mm^2 for which grade F is not applicable.
3. connections welds with hull steel forgings and hull steel castings.

3.1.2 Regarding the welding processes, current rules are applied to fusion welds made using shielded metal arc welding, flux cored arc welding, gas metal arc welding, gas tungsten arc welding, submerged arc welding, electro-slag welding and electro-gas welding processes.

3.1.3 Concerning the weld joints the rules are applied to butt welds with full penetration, tee, corner and cruciform joints with or without full penetration, and fillet welds.

3.1.4 The NDT should be conducted after welds have cooled to ambient temperature and after post weld heat treatment where applicable.

3.1.5 For steels with specified minimum yield stress of 420 N/mm^2 and above, NDT should not be carried out before 48 hours after completion of welding. Where post weld heat treatment (PWHT) is carried out the requirement for testing after 48 hours may be relaxed.

3.2 Applicability of NDT methods

3.2.1 The methods mentioned in this document for detection of surface imperfections are visual testing (VT), liquid penetrant testing (PT) and magnetic particle testing (MT). The methods mentioned for detection of internal imperfections are ultrasonic testing (UT) and radiographic testing (RT).

3.2.1 Applicable methods for testing of the different types of weld joints are given in Table 1.

Weld Joint	Parent Material Thickness	Applicable testing methods
Butt welds with full penetration	thickness < 10mm	VT, PT, MT, RT
	thickness > 10mm	VT, PT, MT, UT, RT
Tee joints, corner joints and cruciform joints with full penetration	thickness < 10mm	VT, PT, MT
	thickness > 10mm	VT, PT, MT, UT
Tee joints, corner joints and cruciform joints without full penetration and fillet welds	All	VT, PT, MT, UT* *UT can be used to monitor the extent of penetration in tee, corner and cruciform joints

Table 1: Applicable methods for testing of weld joints

3.3 General NDT approach

3.3.1 The extent of testing should be planned by the Shipbuilder according to the ship design, ship type and welding processes used. Particular attention should be paid to highly stressed areas.

3.3.2 For each construction, the Shipbuilder should submit a plan for approval by DBS, specifying the areas to be examined and the extent of testing with reference to the NDT procedures to be used. The plan should only be released to the personnel in charge of the NDT and its supervision.

3.3.3 The identification system should identify the exact locations of the lengths of weld examined.

3.3.4 All welds should be subject to visual testing by personnel designated by the Shipyard.

3.3.5 As far as practicable, magnetic particle testing should be preferred over liquid penetrant testing and should cover a minimum weld length of 500mm.

3.3.6 Welded connections of large cast or forged components (stern frame, stern boss, rudder parts, shaft brackets...) should be tested over their full length using MT or PT and at agreed locations using RT or UT.

3.3.7 As given in Table 1, UT or RT or a combination of UT and RT can be used for testing of butt welds with full penetration of 10mm thickness or greater. Methods to be used should be agreed with DBS.

3.3.8 Everyone start/stop point in welds made using automatic (mechanised) welding processes should be examined using RT or UT except for internal members where the extent of testing should be agreed.

3.3.9 Within the agreed NDT plan, the minimum RT test length should be 300mm and the minimum UT test length should be 500mm.

3.4 Acceptance criteria and non-conforming weldments

3.4.1 The acceptance criteria shall observe the Rules, where they are applicable. In all other cases, acceptance criteria shall be mutually agreed to between the shipyard and DBS, in advance.

3.4.2 Acceptance criteria of other codes or standards may be in agreement with DBS and fully or partly replace the requirements specified in the Rules.

3.4.3 Discontinuities which unacceptable as per the Rules or other criteria agreed upon, are referred to as "non-conforming" discontinuities in the Rules.

3.5 Unacceptable indications and repairs

3.5.1 Unacceptable indications should be eliminated and repaired where necessary. The repair welds should be examined on their full length using magnetic particle and ultrasonic or radiographic testing method.

3.5.2 When unacceptable indications are found, additional areas of the same weld length should be examined unless the indication is judged isolated without any doubt. In case of automatic welded joints, additional NDT should be extended to all areas of the same weld length.

3.5.3 The extent of testing can be extended at the surveyor’s discretion when repeated non-acceptable discontinuities are found.

3.5.4 The Shipbuilder should take appropriate actions to monitor and improve the quality of welds to the required level. The repair rate at which corrective action is to be instigated should be identified in the builder’s QA system.

Section 4 – Guidelines for inspections using NDE Techniques

4.1 Application requirements

4.1.1 This document is intended to give general guidance on the extent, methods and recommended quality levels applicable to the non-destructive examinations (NDE), of marine steel castings, except in those cases where alternative criteria have been otherwise approved or specified.

4.1.2 Although no detailed guidelines are given for machinery components, the requirements in these guidelines may apply correspondingly considering their materials, kinds, shapes and stress conditions being subjected.

4.1.3 These requirements are applicable to steel castings intended for hull and machinery applications such as stern frames, rudder frames, crankshafts, turbine casings, bedplates, etc.

4.1.4 Alternatively, castings which comply with national or proprietary specifications may be accepted provided such specifications give reasonable equivalence to these requirements or are otherwise specially approved or required by DBS.

4.1.5 All castings are to be free from surface or internal defects, which would be prejudicial to their proper application in service. The surface finish is to be in accordance with good practice and any specific requirements of the approved plan.

4.2 Applicability of NDT methods

4.2.1 Non-destructive examinations applied for acceptance purposes should be made after the final heat treatment of the casting.

4.2.2 Castings are to be examined in the final delivery condition free from any material such as scale, dirt, grease or paint that might affect the efficacy of the inspection. A thin coating of contrast paint is permissible when using magnetic particle techniques.

4.2.3 Unless otherwise specified in the order, magnetic particle test shall be carried out within 0.3mm of the final machined surface condition for AC techniques or within 0.8mm for DC techniques.

4.2.4 Ultrasonic testing is to be carried out after the castings have been ground, machined or shot blasted to a suitable condition. The surfaces of castings to be examined should be such that adequate coupling can be established between the probe and the casting and that excessive wear of the probe is avoided.

4.3 Extent of Examination

4.3.1 Castings to be examined by NDE methods are identified in Figure 1 to this document. The list of castings is not definitive. Criteria for the examination of other castings not listed in Figure 1 will be subject to agreement.

4.3.1 Zones to be examined in nominated castings are identified in Figure 1. Examinations are to be made in accordance with an inspection plan approved by DBS. The plan should specify the extent of the examination, the examination procedure, the quality level or, if necessary, level for different locations of the castings.

4.3.2 In addition to the areas identified in Figure 1, surface inspections shall be carried out in the following locations:
- at all accessible fillets and changes of section,
- in way of fabrication weld preparation, for a band width of 30mm,
- in way of chaplets,
- in way of weld repairs,
- at positions where surplus metal has been removed by flame cutting, scarifying or arc-air gouging.

4.3.3 Ultrasonic testing shall be carried out in the zones indicated in Figure 1 and also at the following locations:
- in way of all accessible fillets and at pronounced changes of section,
- in way of fabrication weld preparations for a distance of 50mm from the edge,
- in way of weld repairs where the original defect was detected by ultrasonic testing.
- in way of riser positions,
- in way of machined areas particularly those subject to further machining such as bolt hole positions.

4.3.4 In the case of castings such as rudder horns, which may have a large surface area still untested after the above inspections have been applied, an additional ultrasonic inspection of the untested areas should be made along continuous perpendicular grid lines on nominal 225 mm centres, scanning from one surface only.

4.4 Examination Procedures

4.4.1 Steel castings nominated for NDT shall be subjected to a 100% visual examination of all accessible surfaces by the Surveyor. Lighting conditions at the inspected surfaces shall be in accordance with a nationally or internationally recognised standard. Unless otherwise agreed, the visual and surface crack detection inspections are to be carried out in the presence of the Surveyor.

4.4.1 The testing procedures, apparatus and conditions of magnetic particle testing and liquid penetrant testing are to comply with recognised national or international standards. Magnetic particle inspection will be carried out in preference to liquid penetrant testing except in the following cases;

- austenitic stainless steels,
- interpretation of open visual or magnetic particle indications,
- at the instruction of the Surveyor.

4.4.2 For magnetic particle testing attention is to be paid to the contact between the casting and the clamping devices of stationary magnetisation benches in order to avoid local overheating or burning damage in its surface. Prods shall not be permitted on finished machined items. Note that the use of solid copper at the prod tips must be avoided due to the risk of copper penetration.

4.4.3 When indications have been detected as a result of the surface inspection, acceptance or rejection is to be decided in accordance with below paragraph 4.6.

4.4.4 Volumetric inspection in accordance with these guidelines is to be carried out by ultrasonic testing using the contact method with straight beam and/or angle beam technique. The testing procedures, apparatus and conditions of ultrasonic testing are to comply with the recognised national or international standards. Radiographic testing may be carried out on the basis of prior agreement with DBS.

4.4.5 Only those areas shown in the agreed inspection plan need to be tested.

4.4.6 Ultrasonic scans are to be made using a 0o probe of 1 - 4MHz (usually 2MHz) frequency. Whenever possible scanning is to be performed from both surfaces of the casting and from surfaces perpendicular to each other.

4.4.7 The backwall echo obtained on parallel sections should be used to monitor variations in probe coupling and material attenuation. Any reduction in the amplitude of the back wall echo without evidence of intervening defects should be corrected. Attenuation in excess of 30dB/m could be indicative of an unsatisfactory annealing heat treatment.

4.4.8 Machined surfaces, especially those in the vicinity of riser locations and in the bores of stern boss castings, should also be subject to a near surface (25mm) scan using a twin crystal 0^o probe. Additional scans on machined surfaces are of particular importance in cases where boltholes are to be drilled or where surplus material such as 'padding' has been removed by machining thus moving the scanning surface closer to possible areas of shrinkage. Also, it is advisable to examine the machined bores of castings using circumferential scans with 70^o probes in order that axial radial planar flaws such as hot tears can be detected. Fillet radii should be examined using 45^o, 60^o, or 70^o probes scanning from the surfaces/direction likely to give the best reflection.

4.4.9 In the examinations of those zones nominated for ultrasonic examination the reference sensitivity is to be established against a 6mm diameter disk reflector. Sensitivity can be calibrated either against 6mm diameter flat bottomed hole(s) in a reference block (or series of blocks) corresponding to the thickness of the casting provided that a transfer correction is made, or, as a preferred alternative, by using the DGS (distance-gain-size) method. The DGS diagrams issued by a probe manufacturer identify the difference in dB between the amplitude of a back wall echo and that expected from a 6mm diameter disk reflector. By adding this difference to the sensitivity level initially set by adjusting a back wall echo to a reference height eg 80%, the amended reference level will be representative of a 6mm diameter disk reflector. Similar calculations can be used for evaluation purposes to establish the difference in dB between a back wall reflector and disk reflectors of other diameters such as 12 or 15 mm.

4.4.10 Having made any necessary corrections for differences in attenuation or surface condition between the reference block and the casting any indications received from the nominated zones in the casting that exceed the 6mm reference level should be marked for evaluation against the criteria given in 6.3 below. Evaluation should include additional scans with angle probes in order that the full extent of the discontinuity can be plotted.

4.5 Acceptance criteria for Visual Testing

4.5.1 All castings shall be free of cracks, crack-like indications, hot tears, cold shuts or other injurious indications. Thickness of the remains of sprues or risers is to be within the casting dimensional tolerance.

4.5.2 Additional magnetic particle, dye penetrant or ultrasonic testing may be required for a more detailed evaluation of surface irregularities at the request of DBS Surveyor.

4.6 Acceptance criteria for Surface Crack Detection

4.6.1 The following definitions relevant to indications apply:
- Linear indication is an indication in which the length is at least three times the width.
- Non-linear indication is an indication of circular or elliptical shape with a length less than three times the width.
- Aligned indication is three or more indications in a line, separated by 2mm or less edge-to-edge.
- Open indication is an indication visible after removal of the magnetic particles or that can be detected by the use of contrast dye penetrant.
- Non-open indication is an indication that is not visually detectable after removal of the magnetic particles or that cannot be detected by the use of contrast dye penetrant.
- Relevant indication is an indication that is caused by a condition or type of discontinuity that requires evaluation. Only the indications which have any dimension greater than 1.5mm shall be considered relevant.

4.6.2 For the purpose of evaluating indications, the surface is to be divided into reference band length of 150 mm for level MT1/PT1 and into reference areas of 22500mm^2 for level MT2/PT2. The band length and/or area shall be taken in the most unfavourable location relative to the indications being evaluated.

4.6.3 The following quality levels recommended for magnetic particle testing (MT) and/or liquid penetrant testing (PT) are;
- Level MT1/PT1 - fabrication weld preparation and weld repairs.
- Level MT2/PT2 - other locations nominated for surface crack detection in Figure 1.

The allowable numbers and sizes of indications in the reference band length and/or area are given in Table 1. The required quality level should be shown on the manufacturer's inspection plan. Cracks and hot tears are not acceptable.

Quality Level	Max. number of indicators	Type of indication	Max. number of each type	Max. Dimension of single indication, mm (In weld repairs, the maximum dimension is 2mm)
MT1/PT1	4 in 150 mm length	Non-linear	4 (30 mm min. between relevant indications)	5
		Linear		3
		Aligned		3
MT2/PT2	20 in 22500 mm^2 area	Non-linear	10	7
		Linear	6	5
		Aligned	6	5

Table 1: Allowable number and size of indications in a reference band length/area

4.7 Acceptance criteria for Volumetric Testing

4.7.1 Acceptance criteria for ultrasonic testing are identified in Table 2 as UT1 and UT2. The quality levels applicable to the zones to be examined are to be identified on an inspection plan. The following quality levels are nominated for the castings identified in Figure 1.

Level UT1 is applicable to:
- fabrication weld preparations for a distance of 50mm,
- 50mm depth from the final machined surface including boltholes,
- fillet radii to a depth of 50mm and within distance of 50mm from the radius end,
- castings subject to cyclic bending stresses e.g. rudder horn, rudder castings and rudder stocks - the outer one third of thickness in the zones nominated for volumetric examination by Figure 1,
- discontinuities within the examined zones interpreted to be cracks or hot tears.

Level UT2 is applicable to:
- other locations nominated for ultrasonic testing in Figure 1 or on the inspection plan.
- positions outside locations nominated for level UT1 examination where feeders and gates have been removed.
- castings subject to cyclic bending stresses - at the central one third of thickness in the zones of nominated for volumetric inspection by Figure 1.

4.7.2 Ultrasonic acceptance criteria for other casting areas not nominated in Figure 1 will be subject to special consideration based on the anticipated stress levels and the type, size and position of the discontinuity.

Quality Level	Allowable disc shape according to DGS mm (DGS: distance-gain size)	Max. number of indications to be registered (grouped in an area measuring 300 x 300 mm)	Allowable length of linear indications [mm] (measured on the scanning surface)
UT1	>6	0	0
UT2	12-15 >15	5 0	50 0

Table 2 - Ultrasonic Acceptance Criteria for steel castings

4.8 Rectification of Defects

4.8.1 Defects and unacceptable indications must be repaired as indicated below;

4.8.2.1 Defective parts of material may be removed by grinding, or by chipping and grinding, or by arc air-gouging and grinding. Thermal methods of metal removal should only be allowed before the final heat treatment. All grooves shall have a bottom radius of approximately three times the groove depth and should be smoothly blended to the surface area with a finish equal to that of the adjacent surface.

4.8.2.2 Weld repairs should be suitably classified. Major repairs are those;
- where the depth is greater than 25% of the wall thickness or 25mm whichever is less,
- where the total weld area on a casting exceeds 2% of the casting surface noting that where a distance between two welds is less than their average width, they are to be considered as one weld.

Major repairs require the approval of DBS before the repair is carried out. The repair should be carried out before final furnace heat treatment.

4.8.2.3 Minor repairs are those;
- where the total weld area (length x width) exceeds 500mm2.

Minor repairs do not usually require the approval of DBS but should be recorded on a weld repair sketch as a part of the manufacturing procedure documents. These repairs should be carried out before final furnace heat treatment.

4.8.2.4 Cosmetic repairs are;
- all other welds.

Cosmetic repairs do not require the approval of DBS but should be recorded on a weld repair sketch. These repairs may be carried out after final furnace heat treatment but are subject to a local stress relief heat treatment.

4.8.2.5 As advised in UR W8 castings in carbon or carbon manganese steel may require pre-heating prior to welding and also a post weld stress relieving heat treatment depending upon their chemical composition and the dimensions and position of the weld repairs. Post weld heat treatment should be carried out at a temperature of not less than 550°C.

4.8.2.6 Castings subject to the removal of defects may be supplied without welding under the specific conditions;
- on un-machined surfaces where the depth of defect removal is not over 15mm or 10% of wall thickness, whichever is less, and the length of the removed part is not over 100 mm.

4.8.2.7 Parts which are repaired should be examined by the same method as at initial inspection as well as by additional methods as required by the Surveyor.

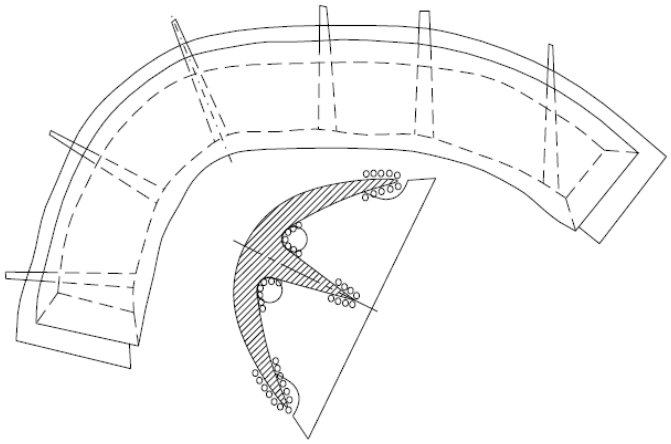


Figure 1a: Extent and methods of non-destructive examination to be applied to typical hull steel castings

Notes: Location of non-destructive examination
1) All surfaces: Visual examination
2) Location indicated with (OOO): Magnetic particle and Ultrasonic testing
3) The detailed extents of examinations and quality levels are given in Sections 4 and 6.

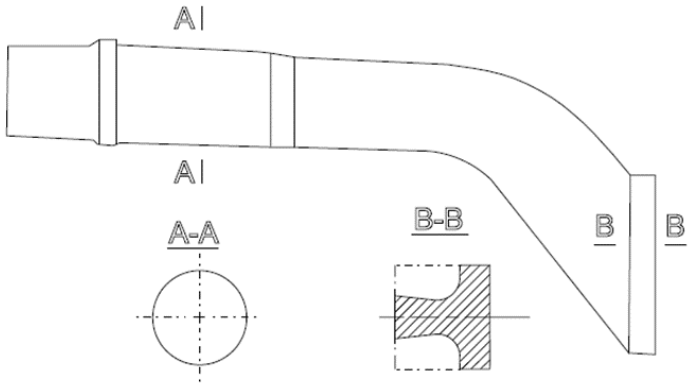


Figure 1b: Rudder stock

Notes: Location of non-destructive examination
1) All surfaces: Visual examination. Magnetic particle and Ultrasonic testing.
2) The detailed extents of examinations and quality levels are given in Sections 4 and 6.

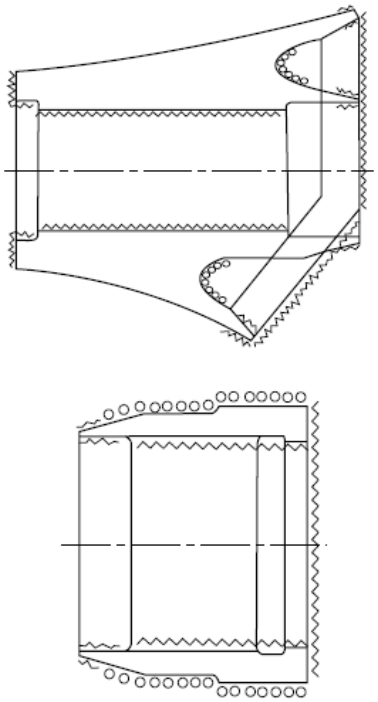


Figure 1c: Stern Boss

Notes: Location of non-destructive examination
1) All surfaces: Visual examination
2) Location indicated with (OOO): Magnetic particle and Ultrasonic testing
3) Location indicated with (^^^^): Ultrasonic testing
4) The detailed extents of examinations and quality levels are given in Sections 4 and 6.

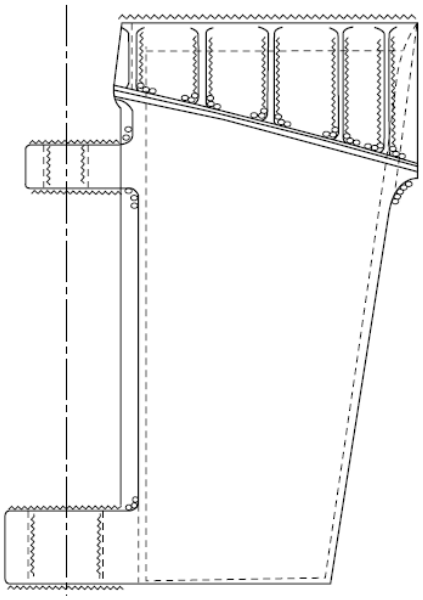


Figure 1d: Rudder Hangings

Notes: Location of non-destructive examination

1) All surfaces: Visual examination
2) Location indicated with (OOO): Magnetic particle and Ultrasonic testing
3) Location indicated with (^^^^): Ultrasonic testing
4) The detailed extents of examinations and quality levels are given in Sections 4 and 6.

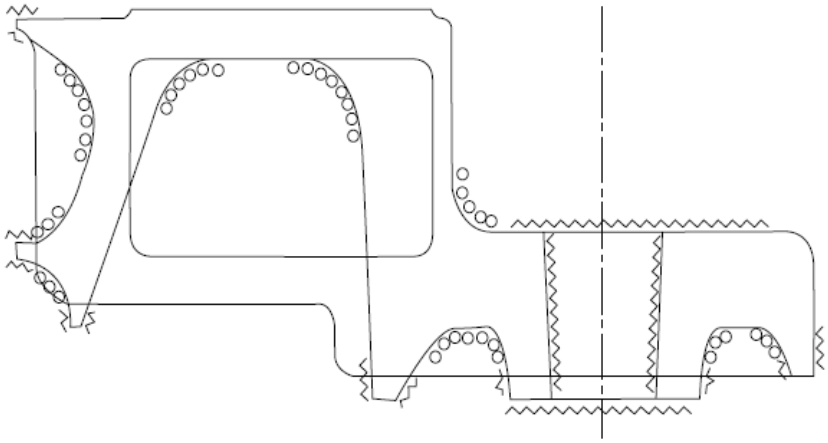


Figure 1e: Rudder (Upper Part)

Notes: Location of non-destructive examination
1) All surfaces: Visual examination
2) Location indicated with (OOO): Magnetic particle and Ultrasonic testing
3) Location indicated with (^^^^): Ultrasonic testing
4) The detailed extents of examinations and quality levels are given in Sections 4 and 6.

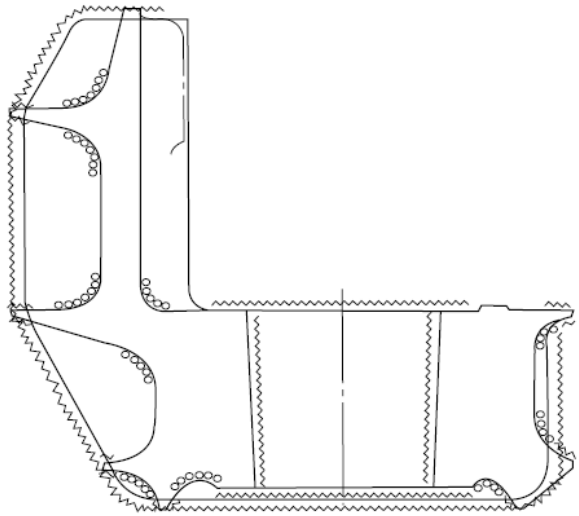


Figure 1f: Rudder (Lower Part)

Notes: Location of non-destructive examination
1) All surfaces: Visual examination
2) Location indicated with (OOO): Magnetic particle and Ultrasonic testing
3) Location indicated with (^^^^): Ultrasonic testing
4) The detailed extents of examinations and quality levels are given in Sections 4 and 6.

Section 5 – NDT examination of hull and machinery steel forgings

5.1 Application requirements

5.1.1 This document contains guidelines on "Surface Inspections" (5.3, 5.4) by visual examination, magnetic particle testing and liquid penetrant testing and "Volumetric Inspection" (5.6) by ultrasonic testing.

5.1.2 These requirements are applicable to steel forgings intended for hull and machinery applications such as rudder stocks, pintles, propeller shafts, crankshafts, connecting rods, piston rods, gearing, etc. Where relevant, these requirements are also applicable to material for forging stock and to rolled bars intended to be machined into components of simple shape.

5.1.3 For steel forgings (e.g. components for couplings, gears, boilers and pressure vessels) other than those specified in these guidelines, the requirements in these guidelines may apply correspondingly considering their materials, kinds, shapes and stress conditions being subjected.

5.2 Applicability of NDE methods

5.2.1 Surface inspections in these guidelines are to be carried out by visual examination and magnetic particle testing or liquid penetrant testing.

5.2.2 The testing procedures, apparatus and conditions of magnetic particle testing and liquid penetrant testing are to comply with the recognized national or international standards.

5.2.3 The steel forgings specified in 5.1.2 and 5.1.3 of the current Section shall be subjected to a 100% visual examination by the Surveyor. For mass produced forgings the extent of examination is to be established at the discretion of DBS.

5.2.4 Surface inspections by magnetic particle and/or liquid penetrant methods generally apply to the following steel forgings:
- crankshafts with minimum crankpin diameter not less than 100 mm;
- propeller shafts, intermediate shafts, thrust shafts and rudder stocks with minimum diameter not less than 100 mm;
- connecting rods, piston rods and crosshead with minimum diameter not less than 75 mm or equivalent cross section,
- bolts with minimum diameter not less than 50 mm, which are subjected to dynamic stresses such as cylinder cover bolts, tie rods, crankpin bolts, main bearing bolts, propeller blade fastening bolts.

5.2.5 Magnetic particle or where permitted liquid penetrant testing, shall be carried out in the zones I and II as indicated in Figures 1 to 4.

5.2.6 The surfaces of forgings to be examined are to be free from scale, dirt, grease or paint.

5.2.7 Where indicated by Figures 1 to 4, magnetic particle inspection will be carried out with the following exceptions, when liquid penetrant testing will be permitted:
- austenitic stainless steels;
- interpretation of open visual or magnetic particle indications,
- at the instruction of the Surveyor.

5.2.8 Unless otherwise specified in the order, the magnetic particle test shall be performed on a forging in the final machined surface condition and final thermally treated condition or within 0.3 mm of the final machined surface condition for AC techniques (0.8mm for DC techniques).

5.2.9 Unless otherwise agreed, the surface inspection is to be carried out in the presence of DBS Surveyor. The surface inspection is to be carried out before the shrink fitting, where applicable.

5.2.10 For magnetic particle testing, attention is to be paid to the contact between the forging and the clamping devices of stationary magnetization benches in order to avoid local overheating or burning damage in its surface. Prods shall not be permitted on finished machined items.

5.2.11 When indications were detected as a result of the surface inspection, acceptance or rejection is to be decided in accordance with below paragraphs 5.3 and 5.4.

5.2.12 Volumetric inspection in these guidelines is to be carried out by ultrasonic testing using the contact method with straight beam and/or angle beam technique.

5.2.13 The testing procedures, apparatus and conditions of ultrasonic testing are to comply with the recognized national or international standards. Generally, the DGS (distance-gain size) procedure is to be applied using straight beam probes and/or angle beam probes with 2 to 4 MHz and inspection should be carried out using a twin crystal 0^o probe for near surface scans (25mm) plus an 0o probe for the remaining volume. Fillet radii should be examined using 45^o, 60^o or 70^o probes.

5.2.14 Personnel engaged in ultrasonic testing is to be qualified in accordance with DBS Rules. The qualification is to be verified by certificates.

5.2.15 Volumetric inspections by ultrasonic testing generally apply to the following steel forgings

5.2.15.1 crankshaft with minimum crankpin diameter not less than 150mm;

5.2.15.2 propeller shafts, intermediate shafts, thrust shafts and rudder stocks with minimum diameter not less than 200 mm,

5.2.15.3 connecting rods, piston rods and crosshead with minimum diameter not less than 200mm or equivalent cross section.

5.2.16 Ultrasonic testing shall be carried out in the zones I to III as indicated in Figures 5 to 8. Areas may be upgraded to a higher zone at the discretion of the Surveyors.

5.2.17 The surfaces of forgings to be examined are to be such that adequate coupling can be established between the probe and the forging and that excessive wear of the probe can be avoided. The surfaces are to be free from scale, dirt, grease or paint.

5.2.18 The ultrasonic testing is to be carried out after the steel forgings have been machined to a condition suitable for this type of testing and after the final heat treatment, but prior to the drilling of the oil bores and prior to surface hardening. Black forgings shall be inspected after removal of the oxide scale by either flame descaling or shot blasting methods.

5.3 Acceptance criteria for Visual Testing

5.3.1 All forgings shall be free of cracks, crack-like indications, laps, seams, folds, or other injurious indications. At the request of the Surveyor, additional magnetic particle, liquid penetrant and ultrasonic testing may be required for a more detailed evaluation of surface irregularities.

5.3.2 The bores of hollow propeller shafts are to be visually examined for imperfections uncovered by the machining operation. Machining marks are to be ground to a smooth profile.

5.4 Acceptance criteria for Magnetic Particle Testing and Liquid Penetrant Testing

5.4.1 The following definitions relevant to indications apply:
Linear indication: an indication in which the length is at least three times the width;
Nonlinear indication: an indication of circular or elliptical shape with a length less than three times the width;
Aligned indication: three or more indications in a line, separated by 2mm or less edge-to-edge;
Open indication: an indication visible after removal of the magnetic particles or that can be detected by the use of contrast dye penetrant;
Non-open indication: an indication that is not visually detectable after removal of the magnetic particles or that cannot be detected by the use of contrast dye penetrant, **Relevant indication**: an indication that is caused by a condition or type of discontinuity that requires evaluation. Only indications which have any dimension greater than 1.5mm shall be considered relevant.

5.4.2 For the purpose of evaluating indications, the surface is to be divided into reference areas of $225cm^2$. The area shall be taken in the most unfavorable location relative to the indication being evaluated.

5.4.3 The allowable number and size of indications in the reference area is given in Table1 for crankshaft forgings and in Table 2 for other forgings, respectively. Cracks are not acceptable. Irrespective of the results of non-destructive examination, the Surveyor may reject the forging if the total number of indications is excessive.

Inspection Zone	Max. Number of indicators	Type of indicators	Max. number for each type	Max. dimension (mm)
I (critical fillet area)	0	Linear Nonlinear Aligned	0 0 0	- - -
II (important fillet area)	3	Linear Nonlinear Aligned	0 3 0	- 3 -
III (journal surfaces)	3	Linear Nonlinear Aligned	0 3 0	- 5 -

Table 1: Crankshaft forgings; Allowable number and size of indications in a reference area of 225cm²

Inspection Zone	Max. Number of indicators	Type of indicators	Max. number for each type	Max. dimension (mm)
I	3	Linear Nonlinear Aligned	0* 3 0*	- 3.0 -
II	10	Linear Nonlinear Aligned	3* 7 3*	3.0 5.0 3.0
Note: * Linear or aligned indications are not permitted on bolts, which receive a direct fluctuating load, e.g. main bearing bolts, connecting rod bolts, crosshead bearing bolts, cylinder cover bolts.				

Table 2: Steel forgings excluding crankshaft forgings; Allowable number and size of indications in a reference area of 225cm²

5.5 Rectification of Defects

5.5.1 Defects and unacceptable indications must be rectified as indicated below:

5.5.1.1 Defective parts of material may be removed by grinding, or by chipping and grinding. All grooves shall have a bottom radius of approximately three times the groove depth and should be smoothly blended to the surface area with a finish equal to the adjacent surface.

5.5.1.2 To depress is to flatten or relieve the edges of a non-open indication with a fine pointed abrasive stone with the restriction that the depth beneath the original surface shall be 0.08mm minimum to 0.25mm maximum and that the depressions be blended into the bearing surface. A depressed area is not considered a groove and is made only to prevent galling of bearings.

5.5.1.3 Non-open indications evaluated as segregation need not be rectified.

5.5.1.4 Complete removal of the defect is to be proved by magnetic particle testing or penetrant testing, as appropriate.

5.5.1.5 Repair welding is not permitted for crankshafts. Repair welding of other forgings is subjected to prior approval of DBS.

5.6 Acceptance criteria for ultrasonic testing

5.6.1 Acceptance criteria of volumetric inspection by ultrasonic testing are shown in Tables 3 and 4.

Type of Forging	Zone	Allowable disc shape according to DGS (distance-gain size)	Allowable length of indication	Allowable distance between two indications In case of accumulations of two or more isolated indications which are subjected to registration the minimum distance between two neighboring indications must be at least the length of the bigger indication.
Crank shaft	I	$d \leq 0.5mm$	-	-
	II	$d \leq 2.0mm$	$\leq 10mm$	$\geq 20mm$
	III	$d \leq 4.0mm$	$\leq 15mm$	$\geq 20mm$
Notes: This applies as well to the distance in axial direction as to the distance in depth. Isolated indications with less distances are to be determined as one single indication.				

Table 3 - Acceptance Criteria for Crankshafts

Type of Forging	Zone	Allowable disc shape according to DGS (distance-gain size) Outer part means the part beyond one third of the shaft radius from the center, the inner part means the remaining core area	Allowable length of indication	Allowable distance between two indications In case of accumulations of two or more isolated indications which are subjected to registration the minimum distance between two neighboring indications must be at least the length of the bigger indication.
Propeller shaft intermediate shaft	II	$outer\ d \leq 2mm$ $inner\ d \leq 4mm$	$\leq 10mm$ $\leq 15mm$	$\geq 20mm$ $\geq 20mm$
Thrust shaft Rudder stock	III	$outer\ d \leq 3mm$ $inner\ d \leq 6mm$	$\leq 10mm$ $\leq 15mm$	$\geq 20mm$ $\geq 20mm$
Connecting rod Piston rod Crosshead	II	$d \leq 2mm$	$\leq 10mm$	$\geq 20mm$
	III	$d \leq 4mm$	$\leq 10mm$	$\geq 20mm$
Notes: This applies as well to the distance in axial direction as to the distance in depth. Isolated indications with less distances are to be determined as one single indication.				

Table 4 - Acceptance Criteria for Shafts and Machinery Components

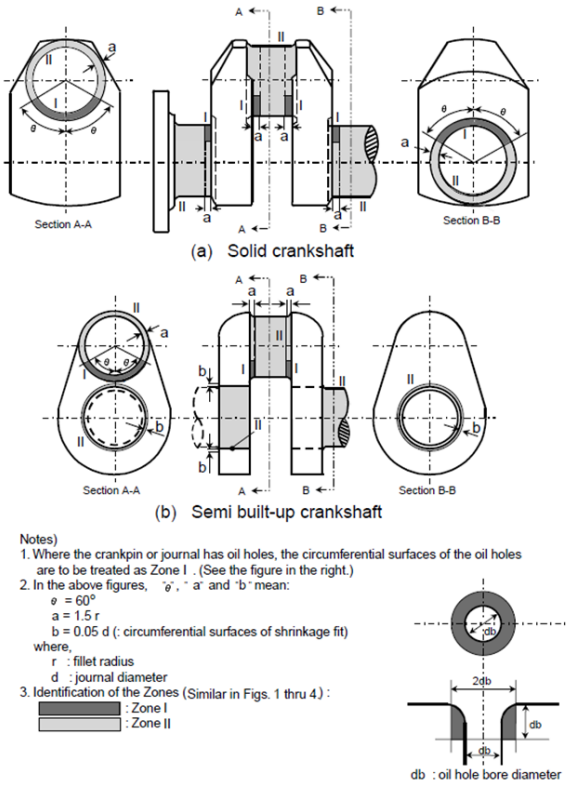


Figure 1: Zones for magnetic particle / liquid penetrant testing on crankshafts

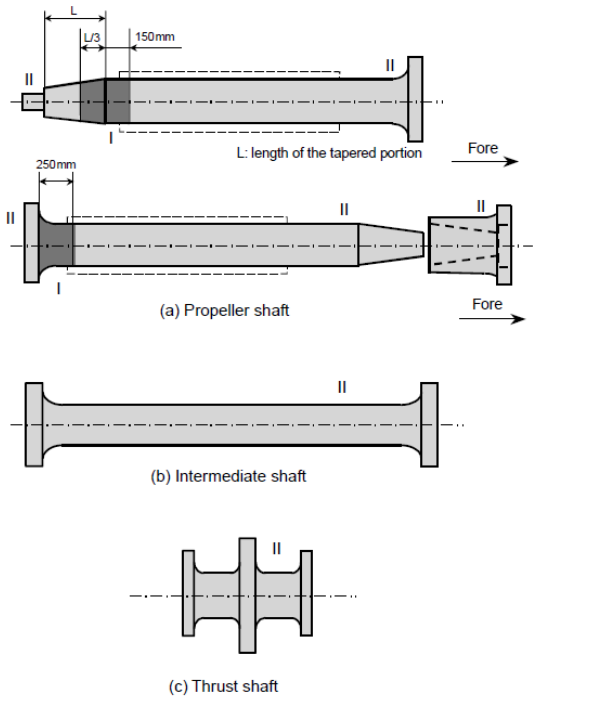


Figure 2: Zones for magnetic particle / liquid penetrant testing on shafts

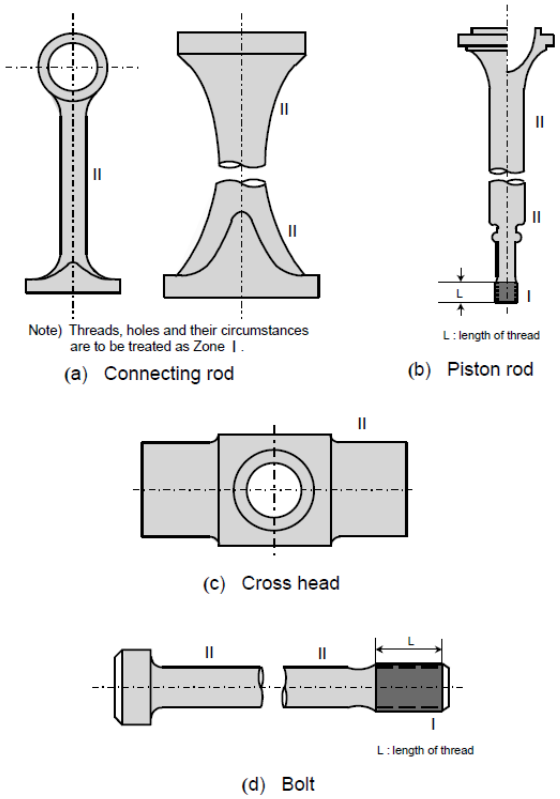


Figure 3: Zones for magnetic particle / liquid penetrant testing on machinery components

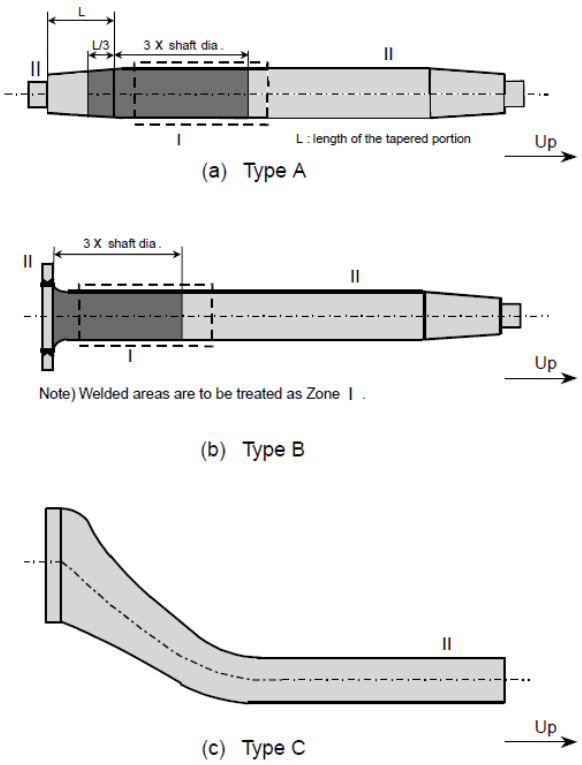


Figure 4: Zones for magnetic particle / liquid penetrant testing on rudder stocks

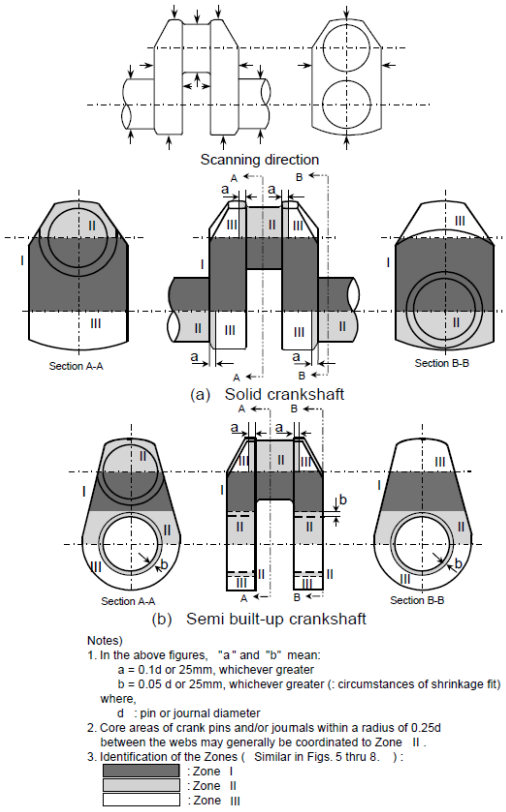
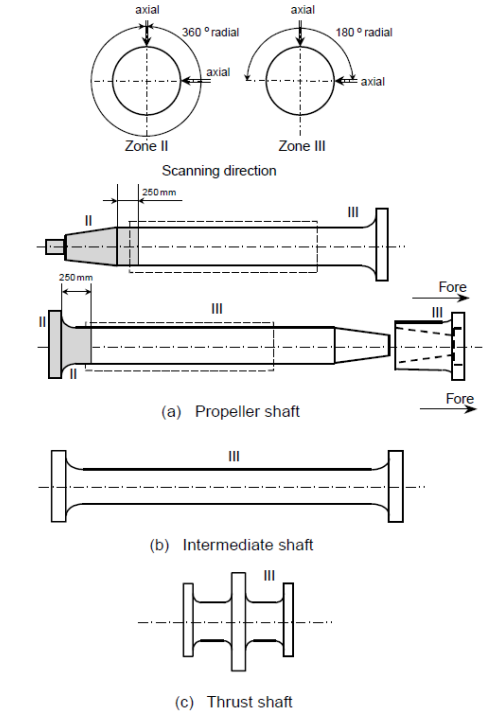


Figure 5: Zones for ultrasonic testing on crankshafts



Notes)
1. For hollow shafts, 360 ° radial scanning applies to Zone III.
2. Circumferences of the bolt holes in the flanges are to be treated as Zone II.

Figure 6: Zones for ultrasonic testing on shafts

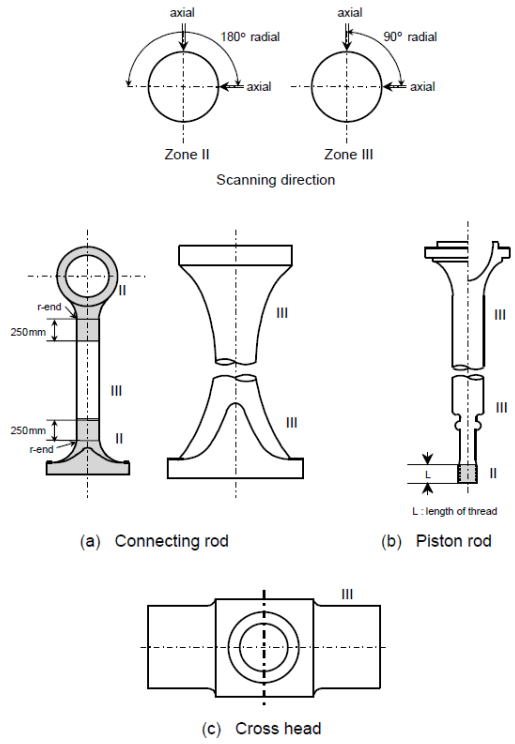


Figure 7: Zones for ultrasonic testing on machinery components

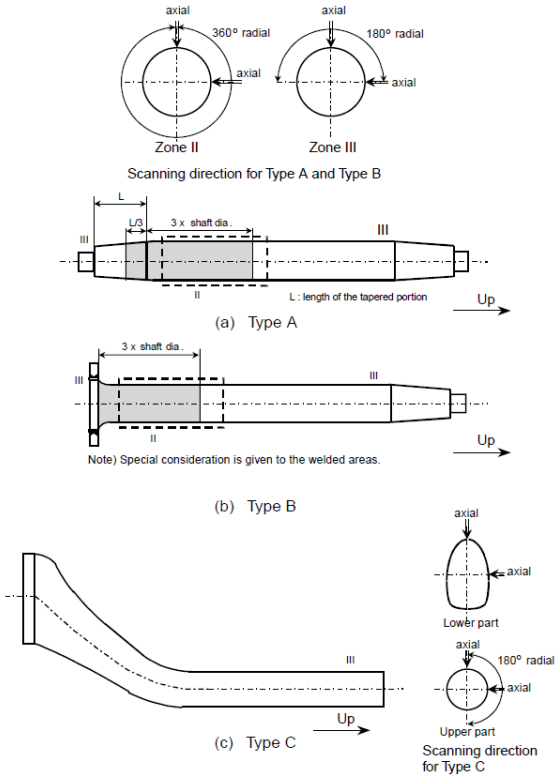


Figure 8: Zones for ultrasonic testing on rudder stocks

Section 6 – Use of remote inspection techniques for surveys

6.1 General requirements

6.1.1 Remote inspection techniques may include the use of:
- Divers
- Unmanned robot arm
- Remote Operated Vehicles (ROV)
- Climbers
- Drones
- Other means acceptable to DBS.

6.1.2 When permitted remote inspection technique may be used to facilitate the required external and internal examinations, including close-up surveys and gauging. The methods applied for remote inspection technique are to provide the survey results normally obtained for/by DBS Surveyor.

The results of the surveys by remote inspection techniques when being used towards the crediting of surveys are to be acceptable to the attending DBS Surveyor. Inspections should be carried out in the presence of DBS Surveyor.

6.1.3 Confirmatory surveys/close-up surveys may be carried out by DBS Surveyor at selected locations to verify the results of the remote inspection technique.

6.1.4 Confirmatory thickness measurements may be requested by the attending DBS Surveyor appropriately.

6.1.5 An inspection plan for the use of remote inspection technique(s), including any confirmatory survey/close-up survey/thickness measurements, is to be submitted for review and acceptance in advance of the survey.

6.1.6 Use of remote inspection technique may be restricted or limited where there is a record or indication of abnormal deterioration or damage to structure or to items to be inspected. The remote inspection technique may not be applicable if there are recommendations for repairs. It may also be inapplicable if conditions, affecting the class of the vessel, are found during the course of the inspection. If the remote inspection technique reveals damage or deterioration that requires attention, DBS Surveyor may require close-up survey/thickness measurements without the use of remote inspection technique to be undertaken.

6.2 Implementation of a remote inspection technique

6.2.1 The inspection is to be carried out by a qualified technician with adequate knowledge of the items to be inspected.

6.2.3 Prior to the commencement of surveys, a pre-meeting should be held between the technician(s), the owner's representative(s) and the attending DBS Surveyor(s) for the purpose to ascertain that all the arrangements detailed in the inspection plan are in place, so as to ensure the safe and efficient conduct of the inspection work to be carried out.

6.2.4 Means of thickness gauging and non-destructive testing may be required in conjunction with the use of remote inspection technique.

6.2.5 Items to be examined using remote inspection technique are to be sufficiently clean to permit meaningful examination.

6.2.6 Visibility is to be sufficient to allow for a meaningful examination.

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Rules for the classification and construction of sea-going vessels

Part 1 – Classification Regulations and Surveys

Chapter 3 – Survey Requirements

01/07/2018
Revision: 1

Revision History

Revision no.	Effective Date	Revision Summary
1	01/07/2018	The revision of this Part is based on: ▪ IMO Res. A.1104(29) (December 2015); ▪ IACS Unified Requirements: UR Z1 (April 2016); UR Z7 (June 2016); UR Z10.2 (February 201); UR Z7.1 (June 2016); UR Z10.1 (February 2015); UR Z10.3 (February 2015); UR Z7.2 (February 2015); UR Z16 (October 2013); UR Z3 (December 2013); UR Z18 (August 2016); UR P (2016); UR Z21 (October 2015); UR F20 (May 2015); UR M74 (May 2016); UR Z23 (November 2016); UR Z13 (January 2011); UR Z10.4 (January 2018) and UR Z10.5 (January 2018). ▪ IACS Recommendations: No. 57 (March 2016) and No. 96 (April 2007) Editorial changes have been carried out.
Initial	01/01/2015	Initial issue

Table of content

Section 1 – Existing ships – Periodical surveys 8
1.1 General requirements 8
1.2 Types of Survey 9
1.3 Applicability of the guidelines 10
1.4 Survey special precautions 12
1.5 General Terms and Definitions 13
1.6 Preparation for survey and means of access 16
1.7 Survey Planning Meeting 17
1.8 Repairs 17
1.9 Imposing a Recommendation/Condition of DBS Class 18
Section 2 – Annual Surveys (Hull and Machinery) 19
2.1 General requirements 19
2.2 Applicability of the survey 19
2.3 Loadline issues 20
2.4 Hull issues 21
2.5 Machinery and Electrical issues 22
2.6 Firefighting system 23
2.7 Oil tanker additional items 24
2.8 Chemical tanker additional items 26
2.9 Gas carrier additional items 27
Section 3 – Intermediate Surveys (Hull and Machinery) 30
3.1 General requirements 30
3.2 Applicability of the survey 30
3.3 Requirements for ballast tanks and cargo spaces 30
3.4 Oil tanker additional items 31
3.5 Chemical tanker additional items 31
3.6 Gas carrier additional items 31
Section 4 – Special Surveys (Hull and Machinery) 32
4.1 General requirements 32
4.2 Dry Dock Survey 33
4.3 Requirements for the Cargo Ship Safety Equipment Certificate 35
4.4 Requirements for the Cargo Ship Safety Construction Certificate 37
4.5 Requirements for Surveys for the Cargo Ship Safety Radio Certificate 40
4.6 Requirements for the for the International Load Line Certificate 42
4.7 Requirements for Surveys for the International Oil Pollution Prevention Certificate 42
4.8 Requirements for Surveys for the International Sewage Pollution Prevention Certificate 43
4.9 Requirements for the International Air Pollution Prevention Certificate and the Nox Technical Code 43
Section 5 – Surveys for Bulk Carriers 46

5.1 General requirements 46
5.2 Thickness measurements and close-up surveys 46
5.3 Extent of Overall and Close-up Survey 46
5.4 Renewal Survey-Additional items for hull 47
5.5 Renewal Survey-Additional items for machinery 52
5.6 Annual Survey-Additional items for hull 52
5.7 Intermediate survey- Additional items for hull 54
Section 6 – Surveys for Oil Tankers 57
6.1 General requirements 57
6.2 Procedures for Thickness measurements 57
6.3 Renewal Survey-Additional items for hull 57
6.4 Renewal Survey-Additional items for machinery 62
6.5 Annual Survey-Additional items 66
6.6 Intermediate survey- Additional items 67
Section 7 – Surveys for Chemical Tankers 69
7.1 General requirements 69
7.2 Thickness measurements and close-up surveys 69
7.3 Extent of Overall and Close-up Survey 69
7.4 Renewal Survey-Additional items for hull 69
7.5 Renewal Survey-Additional items for machinery 77
7.6 Annual Survey-Additional items 80
7.7 Intermediate survey- Additional items 80
Section 8 – Surveys for Liquified Gas Carriers 82
8.1 General requirements 82
8.2 Thickness measurements and close-up surveys 82
8.3 Extent of Overall and Close-up Survey 82
8.4 Renewal Survey-Additional items for hull 82
8.5 Renewal Survey-Additional items for machinery 85
8.6 Annual Survey-Additional items for hull 88
8.7 Annual Survey -Additional items for machinery 89
8.8 Intermediate survey - Additional items for hull 89
8.9 Intermediate survey- Additional items for machinery 90
Section 9 – Surveys for Passenger Ships 91
9.1 General requirements 91
9.2 Requirements for Surveys for the Passenger Ship Certificate 92
Section 10 – Survey of the Outside of the Ship's Bottom 103
10.1 General 103
10.2 Applicability of the survey 103
10.3 In-Water Surveys 104
Section 11 – Boiler Surveys 105

11.1 Frequency and type of Survey 105
11.2 Survey of Steam Boilers 105
11.3 Propulsion Steam Turbines: Modification of First Special Survey 106
11.4 Machinery Verification Runs 106
Section 12 – Pipes surveys 107
12.1 General 107
12.2 Classes of pipes 107
12.3 Requirements for steam pipes 108
12.4 Requirements for pipes intended for liquefied gases 108
12.5 Surveys and testing of pipes 108
Section 13 – Surveys of screw shafts, tube shafts and propellers 110
12.1 Application 110
12.2 Definitions 110
13.2 Oil Lubricated shafts or Closed Loop System Fresh Water Lubricated Shafts (closed system) 111
13.3 Water Lubricated shafts (open systems) 117
Section 14 – Surveys of inert gas systems 120
14.1 General 120
14.2 Requirements for all systems on Tankers including Chemical Tankers to which SOLAS regulation II-2/4.5.5.1 applies 120
14.3 Additional requirements for Nitrogen Generator Systems on Tankers including Chemical Tankers to which SOLAS regulation II-2/4.5.5.1 applies 120
14.4 Nitrogen/Inert Gas Systems fitted for purposes other than Inerting Required by SOLAS Req. II-2/4.5.5.1 and 4.5.5.2 121
14.5 Annual Surveys-Oil tanker gas system survey 122
14.6 Annual Surveys - Gas carrier inert system survey 123
14.7 Special Surveys 123
Section 15 – Surveys of vessels with refrigerated cargo installations 124
15.1 General 124
15.2 Periodical surveys 124
15.3 Continuous special survey of refrigerating installation 124
15.4 Annual survey requirements 124
15.5 Requirements of first Special Survey 125
15.6 Subsequent Special Surveys 126
15.7 Loading Port Surveys 126
Section 16 – Surveys for the vapour control systems 128
16.1 For tankers and combination carriers with notation VCS1 128
16.2 For tankers and combination carriers with notation VCS2 129
Section 17 – Surveys of Thermal Oil Heating Systems 130
17.1 General 130
17.2 Oil fired thermal oil heater and Economiser 130
17.3 Circulating pumps 130
17.4 Dump cooler 130

17.5 Piping arrangement 130
17.6 Expansion tank 130
17.7 Alarms and safety devices 130
17.8 Thermal oil analysis 131
17.9 System operation test 131
17.10 Repairs 131
Section 18 – Surveys of external firefighting systems 132
18.1 General 132
18.2 Annual surveys 132
18.3 Periodical surveys 133
18.4 Renewal Survey 133
Section 19 – Survey Requirements for Additional Systems and Services 134
Crew Habitability on Ships 134
19.1 Annual Surveys 134
19.2 Special Periodical Surveys 134
19.3 Requirements for Ship Alterations 136
19.4 Requirements for Geographical Area of Ship Operations 136
Section 20 – Surveys for electrical equipment 137
20.1 General 137
20.2 Definitions 137
20.3 Qualification of the personnel 137
20.4 Survey of electrical equipment installed in hazardous areas on tankers 137
Section 21 – Survey requirements for DPS notations 140
21.1 Annual surveys 140
21.2 First Drydocking Survey after Delivery 141
21.3 Special Periodical Surveys 141
Section 22 – Survey requirements for OPS (Onshore Power Supply) notations 142
22.1 General 142
22.2 Definitions 142
22.3 System description and requirements 143
22.4 Surveys 145
Section 23 – Surveys for Ballast Water Management Systems (BWMS) 146
23.1 General 146
23.2 Definitions 146
23.3 Installations requirements 146
23.4 Additional requirements for tankers 148
23.4.4 Surveys for BWMS 149
Section 24 – Hull Survey for New Construction 151
24.1 General requirements 151
24.2 Definitions 151

24.3 Applicability of the survey 151
24.4 Qualification and monitoring of personnel 152
24.5 Survey of the hull structure 152
24.6 Review of the construction facility 152
24.7 Newbuilding survey planning 153
24.8 Examination and test plan for newbuilding activities 153
24.9 Proof of the consistency of surveys 153
24.10 Ship Construction File 154
24.11 Ship yard Review Record 162
24.12 Requirements for Tankers and Bulk Carriers subject to SOLAS Chapter II-1 Part A-1 Regulation 3-10 Goal-based ship construction standards for bulk carriers and oil tankers 169
Section 25 – Damage and repair surveys 177
25.1 General requirements 177
25.2 Applicability of the survey 177
25.3 Voyage Repairs and Maintenance 177
Section 26 – Hull Surveys for General Dry Cargo Ships 179
26.1 General 179
26.2 Special Survey 181
26.3 Annual Survey 183
26.4 Intermediate Survey 185
26.3 Preparation for survey 186
26.4 Procedures for thickness measurement 187
26.5 Procedures for certification of firms engaged in thickness measurement of hull structures 192

Section 1 – Existing ships – Periodical surveys

1.1 General requirements

1.1.1 The harmonized system, a diagrammatic arrangement of which is given in Figure 1, provides for:

1.1.1.1 a one-year standard interval between surveys, based on initial, annual, intermediate, periodical and renewal surveys, as appropriate, except for MARPOL Annex IV which is based on initial and renewal surveys;

1.1.1.2 a scheme providing the necessary flexibility to execute each survey, with provision for:
- completion of the renewal survey within three months before the expiry date of the existing certificate with no loss of its period of validity; and
- a "time window" of six months – from three months before to three months after the anniversary date of the certificate for annual, intermediate and periodical surveys;

1.1.1.3 a maximum period of validity of five years for all cargo ship certificates,

1.1.1.4 a maximum period of validity of 12 months for the Passenger Ship Safety Certificate;

1.1.1.5 a system for the extension of certificates limited to three months, enabling a ship to complete its voyage, or one month for ships engaged on short voyages;

1.1.1.6 when an extension has been granted, the period of validity of the new certificate starting from the expiry date of the existing certificate before its extension;

1.1.1.7 a flexible system for inspection of the outside of the ship's bottom on the following conditions:
- a minimum of two inspections during any five-year period of validity of the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate;
- the interval between any two such inspections should not exceed 36 months;

1.1.1.8 a Cargo Ship Safety Certificate under SOLAS 74/88, as an alternative to separate Cargo Ship Safety Construction, Cargo Ship Safety Equipment and Cargo Ship Safety Radio Certificates; and

1.1.1.9 a flexible system concerning the frequency and the period of validity of certificates, subject to the minimum pattern of surveys being maintained.

1.1.2 In implementing the harmonized system, the following principal changes made to the survey and certification requirements of SOLAS 74/88 have been taken into account:

1.1.2.1 unscheduled inspections are no longer included and annual surveys are mandatory for cargo ships;

1.1.2.2 intervals between the periodical surveys of equipment covered by the Cargo Ship Safety Equipment Certificate are alternately two and three years instead of two years;

1.1.2.3 intermediate surveys are required for all ships under the Cargo Ship Safety Construction Certificate;

1.1.2.4 inspection of the outside of the ship's bottom is required for all cargo ships;

1.1.2.5 intermediate surveys for the Cargo Ship Safety Construction Certificate are held within three months of either the second or third anniversary date;

1.1.2.6 all cargo ship certificates may be issued for any period of validity up to and including five years;

1.1.2.7 there is provision for a Cargo Ship Safety Certificate; and

1.1.2.8 the extension provisions have been reduced from five months to three months to enable a ship to complete its voyage and the extension for one month for a period of grace is limited to ships engaged on short voyages.

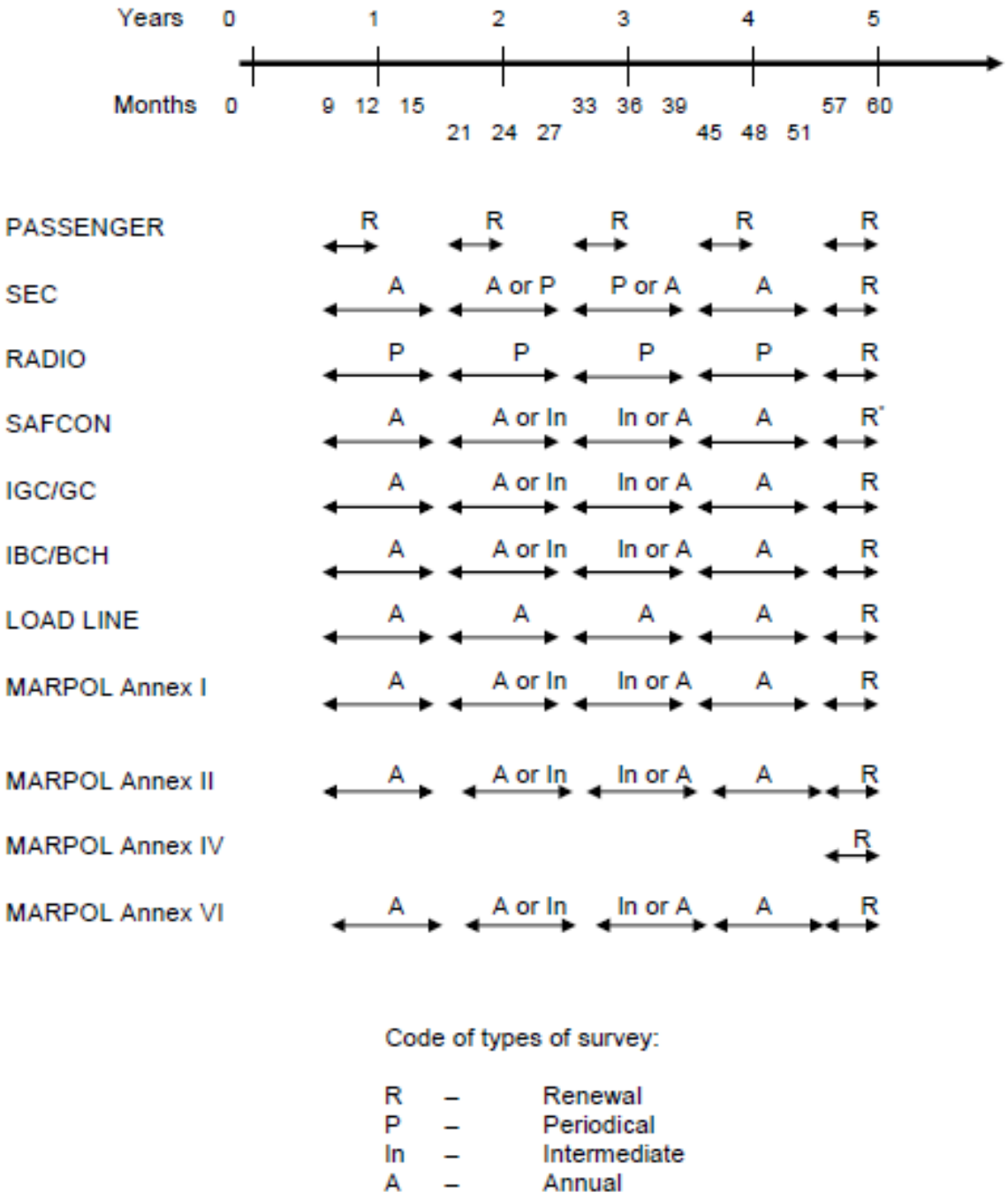


Figure 1

1.2 Types of Survey

1.2.1 An **initial survey** is a complete inspection before a ship is put into service of all the items relating to a particular certificate, to ensure that the relevant requirements are complied with and that these items are satisfactory for the service for which the ship is intended.

1.2.2 A **periodical survey** is an inspection of the items relating to the particular certificate to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended. A **renewal survey** is the same as a periodical survey but also

leads to the issue of a new certificate. The renewal survey is also called as **hull special survey**. The latter is the term used in the herein Sections of the current rules and regulations.

1.2.3 An **intermediate survey** is an inspection of specified items relevant to the particular certificate to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended.

1.2.4 An **annual survey** is a general inspection of the items relating to the particular certificate to ensure that they have been maintained and remain satisfactory for the service for which the ship is intended.

1.2.5 An inspection of the outside of the ship's bottom is an **inspection of the underwater part of the ship** and related items to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended.

1.2.6 An **additional survey** is an inspection, either general or partial according to the circumstances, to be made after a repair resulting from investigations or whenever any important repairs or renewals are made.

1.3 Applicability of the guidelines

1.3.1 SOLAS 74/88 regulation I/12(v) provides for a Cargo Ship Safety Certificate to be issued as an alternative to the Cargo Ship Safety Equipment Certificate, the Cargo Ship Safety Construction Certificate and the Cargo Ship Safety Radio Certificate. Consequently, the surveys for the issue and renewal of the Cargo Ship Safety Certificate should be in accordance with the certificates it replaces and, similarly, the annual and intermediate surveys should be the same as those required for the replaced certificates and the appropriate sections of the Cargo Ship Safety Certificate, endorsed accordingly.

1.3.2 For the application of these guidelines, the following guidance on terms used in the survey requirements is provided:

1.3.2.1 "Examining" except where used in "examining the plans" or "examining the design" should be understood as a thorough examination, using appropriate techniques, of the components, system or appliance in question for satisfactory provision, arrangement and condition and for any signs of defects, deterioration or damage;

1.3.2.2 "Testing" should be understood as a functional test of the system or appliance in question, to confirm its satisfactory operation and performance for its intended use.

1.3.3 If a survey shows that the condition of the ship or its equipment does not correspond substantially with the particulars of the certificate or is not fit to proceed to sea without danger to the ship, or persons on board, or without presenting unreasonable threat of harm to the environment, the nominated DBS surveyor will be guided by the requirements of SOLAS 74/88 regulation I/6(c), MARPOL Annex I regulation 6.3.3, MARPOL Annex II regulation 8.2.5, MARPOL Annex IV regulation 4.5, MARPOL Annex VI regulation 5.3.3, IBC Code regulation 1.5.1.4, IGC Code regulation 1.5.1.3 and BCH Code regulation 1.6.1.3. These instruments require that corrective action be taken immediately and the survivor notified in due course. In cases where the corrective action has not been undertaken the relevant certificate should be withdrawn and the Survivor notified immediately.

1.3.4 Although LLC 66/88 does not contain specific requirements, if a load line survey shows the condition of the ship or its equipment does not correspond substantially with the particulars of the certificate or is not fit to proceed to sea without danger to the ship, or persons on board, or without presenting unreasonable threat of harm to the environment, the nominated DBS surveyor or recognized organization should, nevertheless, be guided by 1.3.5

1.3.5 If a survey shows that the condition of the ship and its equipment correspond substantially with the particulars of the certificate, and the ship is fit to proceed to sea without danger to the ship, or persons on board, and without presenting unreasonable threat of harm to the environment, but deficiencies exist that cannot be rectified at the time of survey, the following should be guided:

1.3.5.1 A condition should be issued, detailing any relevant requirements or conditions with assigned due date for the time needed to rectify the deficiencies, with relevant information being kept available on board. If and as required by the Surveyor, the relevant certificates should be issued with the appropriate expiry dates; and

1.3.5.2 The DBS society should be notified, as appropriate.

1.3.6 Related items mean those items which may only be inspected when the ship is in dry dock or undergoing an in-water examination of the outside of its bottom. For oil tankers, chemical tankers and gas carriers, this may mean that the ship has to be specially prepared by, for example, being cleaned and gas-freed.

1.3.7 Where a certificate has been issued for a period of less than five years, it is permissible under these regulations or article to extend the certificate so that its maximum period of validity is five years provided that the pattern of surveys for a certificate with a five-year period of validity is maintained (see Sec 1/Figure 1)

1.3.8 It is permitted that the period of five years in which two inspections of the ship's bottom are to be carried out to be extended when the Cargo Ship Safety Construction Certificate is extended under regulation I/14(e) and (f). However, no extension should be permitted on the period of 36 months between any two such inspections. If the first ship's bottom inspection is carried out between 24 and 27 months, then the thirty-sixth-month limitation may prevent the certificate being extended by the periods permitted in regulation I/14(e) and (f).

1.3.9 For the purpose of these regulations or article, a "short voyage" means a voyage where neither the distance from the port in which the voyage begins and the final port of destination nor the return voyage exceeds 1,000 miles

1.3.10 The purpose of these regulations is to permit DBS society to waive the requirement that a certificate issued following a special survey that is completed after the expiry of the existing certificate should be dated from the expiry date of the existing certificate. The special circumstances when this could be permitted are where the ship has been laid-up or has been out of service for a considerable period because of a major repair or modification. Whilst the special survey would be as extensive as if the ship had continued in service, the DBS society should consider whether additional surveys or examinations are required depending on how long the ship was out of service and the measures taken to protect the hull and machinery during this period. Where this regulation is invoked, it is reasonable to expect an examination of the outside of the ship's bottom to be held at the same time as the renewal survey when it would not be necessary to include any special requirements for cargo ships for the continued application of SOLAS 74/88 regulation I/10(a)(v).

1.3.11 A certificate ceases to be valid if the special, intermediate or annual survey, as appropriate, or the inspection of the outside of the ship's bottom is not completed within the periods specified in the relevant regulation. The validity of the certificate should be restored by carrying out the appropriate survey which, in such circumstances, should consist of the requirements of the survey that was not carried out, but its thoroughness and stringency should have regard to the time this survey was allowed to lapse.

1.3.12 Any five-year period is the five-year period of validity of the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate.

1.3.13 The certificates cease to be valid when a ship transfers to the flag of another State and it is required that the Government of the State to which the ship transfers should not issue new certificates until it is fully satisfied that the ship is being properly maintained and that there have been no unauthorized changes made to the structure, machinery and equipment.

1.3.14 If a ship at the time when a certificate expires is not in a port in which it is to be surveyed, the DBS society may extend the period of validity of a certificate but this extension should be granted only for the purpose of allowing the ship to complete its voyage to the port in which it is to be surveyed, and then only in cases where it appears proper and reasonable to do so. No certificate should be extended for a period longer than three months, and a ship to which an extension is granted should not, on its arrival in the port in which is to be surveyed, be entitled by virtue of such extension to leave that port without having a new certificate.

1.3.15 If a ship is in a port where the required survey cannot be completed, and where the Convention allows the DBS society to extend the certificate when it is proper and reasonable to do so, the DBS society can be guided by the following:

1.3.15.1 an additional survey, equivalent to at least the same scope of an annual survey required by the relevant certificate(s) should be carried out;

1.3.15.2 the renewal survey should be carried out to the maximum extent possible;

1.3.15.3 in cases where a dry docking is required, but cannot be carried out, an underwater inspection of the ship's bottom should be carried out;

1.3.15.4 in cases where an underwater inspection is not possible (e.g. poor water visibility, draft restrictions, excessive current, refusal by the port Authority), an internal inspection of the ship's bottom structure, to the maximum extent practicable, should be carried out;

1.3.15.5 the ship should be allowed to sail directly to a named final agreed cargo discharge port and then directly to a named agreed port to complete the survey and/or dry docking;

1.3.15.6 the extension period should be for the minimum amount of time needed to complete the survey and/or dry docking under the relevant certificate(s);

1.3.15.7 the condition of the ship found by the surveys indicated above should be considered in determining the duration, distance and operational restrictions, if any, of the voyage needed to complete the survey and/or dry docking; and

1.3.15.8 the extension period of the relevant statutory certificate(s) should not exceed the period of validity of the certificate which may be issued to document compliance with the structural, mechanical and electrical requirements of the recognized classification society.

1.3.16 A minimum of two of the inspections of the outside of the ship's bottom during any five-year period should be conducted in dry-dock. In all cases, the maximum interval between any two dry-dock bottom inspections should not exceed 36 months.

1.3.17 The minimum number of inspections in dry-dock of the outside of the bottom of a passenger ship (which is not a ro-ro passenger ship) in any five-year period may be reduced from two to one. In such cases the interval between consecutive inspections in dry-dock should not exceed 60 months.

1.3.18 Inspections of the ship's bottom required for the renewal survey that are not conducted in dry-dock may be carried out with the ship afloat. The bottom inspection, regardless of method, should be carried out within the allowable time window for the Passenger Ship Safety Certificate renewal survey (i.e. within the three-month time window before the expiry date of the certificate). Additionally, inspections of the outside of the ship's bottom conducted afloat should only be carried out when the conditions are satisfactory and the proper equipment and suitably qualified staff is available. Rudder bearing clearances specified in (PR) 5.2.2.1 need not be taken at the afloat inspections.

1.3.19 Special consideration should be given to ships 15 years of age or over before being permitted to credit inspections afloat.

1.3.20 If a survey in dry-dock is not completed within the maximum intervals referred to above, the Passenger Ship Safety Certificate should cease to be valid until the survey in dry-dock is completed.

1.3.21 The **survey of the radio installations**, including those used in life-saving appliances, should always be carried out by a qualified radio surveyor who has necessary knowledge of the requirements of SOLAS 74, the International Telecommunication Union's Radio Regulations and the associated performance standards for radio equipment. The radio survey should be carried out using suitable test equipment capable of performing all the relevant measurements required by these guidelines. On satisfactory completion of the survey, the radio surveyor should forward a report of the survey, which should also state the organization he represents, to the authorities responsible for the issue of the ship's Cargo Ship Safety Radio Certificate or Passenger Ship Safety Certificate.

1.3.22 The **survey of the automatic identification system (AIS)** should always be carried out by a qualified radio surveyor who has necessary knowledge of the requirements of SOLAS 74, the International Telecommunication Union's Radio Regulations and the associated performance standards for radio equipment. The survey of the automatic identification system should be carried out using suitable test equipment capable of performing all the relevant measurements required by and in accordance with the Guidelines on annual testing of the Automatic Identification System (AIS) (MSC.1/Circ.1252).

1.3.23 **Survey at sea or at anchorage** may be accepted provided the Surveyor is given the necessary assistance from the personnel onboard. Necessary precautions and procedures for carrying out the survey are to be in accordance with 1.8.

1.4 Survey special precautions

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

1.4.2 When boats or rafts are used, appropriate life jackets are to be available for all participants. Boats or rafts are to have satisfactory residual buoyancy and stability even if one chamber is ruptured. A safety checklist is to be provided.

1.4.3 Surveys of tanks by means of boats or rafts may only be undertaken at the sole discretion of the Surveyor, who is to take into account the safety arrangements provided, including weather forecasting and ship response in reasonable sea conditions.

1.4.4 When rafts or boats will be used for close-up survey the following conditions shall be observed:

1.4.4.1 Only rough duty, inflatable rafts or boats, having satisfactory residual buoyancy and stability even if one chamber is ruptured, shall be used;

1.4.4.2 The boat or raft shall be tethered to the access ladder and an additional person shall be stationed down the access ladder with a clear view of the boat or raft;

1.4.4.3 Appropriate lifejackets shall be available for all participants;

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

1.4.4.5 The tank or space must contain clean ballast water only. When a thin sheen of oil on the water is observed, further testing of the atmosphere is to be done to ensure that the tank or space is safe for entering. The testing should be carried out by a certified "Marine Chemist" or a "Competent person" or similar accredited person who will issue a certificate stating whether the space is 'safe for man' and/or work, and if any special conditions are to be observed. Ventilation should be stopped about 10 minutes before tests are made and not restarted until the tests are completed. The testing should be carried out in the following sequence

- Oxygen - deficient or - enriched atmospheres
- Flammable atmospheres
- Toxic atmospheres when considered necessary

1.4.4.6 At no time shall the upside of the boat or raft be allowed to be within 1 m of the deepest under deck web face flat so that the survey team is not isolated from a direct escape route to the tank hatch. Filling to levels above the deck transverses shall only be contemplated if a deck access manhole is fitted and open in the bay being examined, so that an escape route for the survey party is available at all times;

1.4.4.7 If the tanks (or spaces) are connected by a common venting system, or inert gas system, the tank in which the boat or raft is to be used shall be isolated to prevent a transfer of gas from other tanks (or spaces).

1.4.5 In addition to the above, rafts or boats alone may be allowed for close-up survey of the under deck areas for tanks or spaces if the depth of the webs are 1.5 m or less. If the depth of the webs is more than 1.5 m, rafts or boats alone may be allowed only.

1.4.6 When the coating of the under deck structure is in GOOD condition and there is no evidence of wastage; or

1.4.7 If a permanent means of access is provided in each bay to allow safe entry and exit.

1.4.8 The establishment of proper preparation and the close co-operation between the attending surveyor(s) and the company's representatives onboard prior to and during the survey are an essential part in the safe and efficient conduct of the survey.

1.4.9 Applicable safety procedures and responsibilities shall be discussed and agreed to ensure that the survey is carried out under controlled conditions. Safety Meetings shall be held prior to entering the tank or space and regularly during the survey on board.

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

1.4.11 A communication system shall be arranged between the survey party in the tank or space being examined, the responsible officer on deck, the navigation bridge and the personnel in charge of handling the ballast pump(s) in the pump control room. These communication arrangements shall be maintained throughout the survey.

1.4.12 Adequate and safe lighting shall be provided for the safe and efficient conduct of the survey.

1.4.13 Adequate protective clothing shall be made available and used (e.g. safety helmet, gloves, safety shoes, etc) during the survey.

1.5 General Terms and Definitions

1.5.1 An **Oil Tanker** is a ship which is constructed primarily to carry oil in bulk and includes ship types such as combination carriers (Ore/Oil ships etc.).

1.5.2 A **Double Hull Oil Tanker** is a self-propelled sea going ship which primarily is meant for the carriage of oil in bulk, where the cargo tanks are secured by a doublehull extending for the entire length of the cargo area, consisting of double side and double bottom spaces for thecarriage of salt-water ballast.

1.5.3 A **Bulk Carrier** is a self-propelled sea going ship which has single deck, double bottom, topside tanks and hopper side tanks and with single side skin construction in the cargo length area, and is primarily meant for carrying dry cargo in bulk and cover ship types such as ore carriers. Where referred to in Chapter 3, it shall also include double skin bulk carriers except where specified otherwise.

1.5.4 A **Double Skin Bulk Carrier** is a self-propelled sea going ship which generally has singledeck, double bottom, topside tanks and hopper side tanks and with double side skin construction in the cargo length area (regardless of the width of the wing space), and is primarily meant for carrying dry cargo in bulk and cover such ship types as ore carriers.

1.5.5 An **Ore Carrier** is a self-propelled sea going shipwhich generally has single deck, two longitudinal bulkheads and a double bottom throughout the cargo length area and is primarily meant for carrying ore cargoes in the centre holds only.

1.5.6 A **Chemical Tanker** is a self-propelled sea going ship which generally has integral tanks and being single or double hull construction, or having alternative structural arrangements, is used primarily for the carrying bulk of any liquid product listed in Chapter 17 of the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk, IBC Code.

1.5.7 A **Gas Carrier** is a cargo ship constructed or adapted for carrying in bulk any liquefied gas or other products of flammable nature listed in Chapter 19 of the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk.

1.5.8 A **Ballast Tank** is a tank which solely carries salt-water ballast. For bulk carriers, a space which is used for both cargo and salt-water ballast will be treated as a salt-water ballast tank when substantial corrosion has been found in that space. For double skin bulk carriers, the doubleside tank is to be considered as a distinct tank even if it is connected to either the topside or hopper side tank. For oil tankers and chemical tankers, a combined tank which is used for both cargo and salt-water ballast as a routine part of the ship's operation will be treated as a ballast tank. A cargo tank, which in exceptional cases, may carry salt-water water ballast during extreme weather conditions and is not designated as a combined cargo / ballast tank will be considered as a cargo tank.

1.5.9 **Spaces** are distinct compartments such as tanks, holds, cofferdams and void spaces bounding cargo holds, decks and the outer hull.

1.5.10 An **Overall Survey** is a survey reports the overall condition of the hull structure and helps in determining the extent of additional Close-up Surveys.

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

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

1.5.13 **Representative Spaces** are those spaces which are expected to reflect the condition of other spaces of similartype, service and with similar corrosion preventionsystems. When selecting representative spaces, the service and repair history on board andidentifiable Critical Structural Areas are to be taken into account.

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

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

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

1.5.17 **Pitting corrosion** is defined as scattered corrosion spots/areas with local material reductions which are greater than the general corrosion in the surrounding area. Pitting intensity is defined in Figure 1.

1.5.18 **Edge corrosion** is defined as local corrosion at the free edges of plates, stiffeners, primary support members and around openings. An example of edge corrosion is given in Figure 2.

1.5.19 **Grooving corrosion** is typically local material loss adjacent to weld joints along abutting stiffeners and at stiffener or plate butts or seams. An example of groove corrosion is shown in Figure 3.

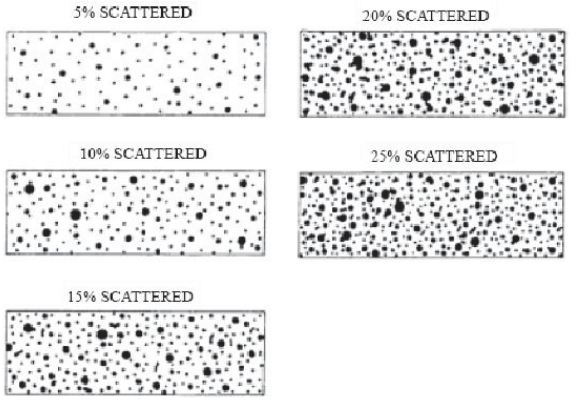


Figure 1 - Pitting intensity diagrams

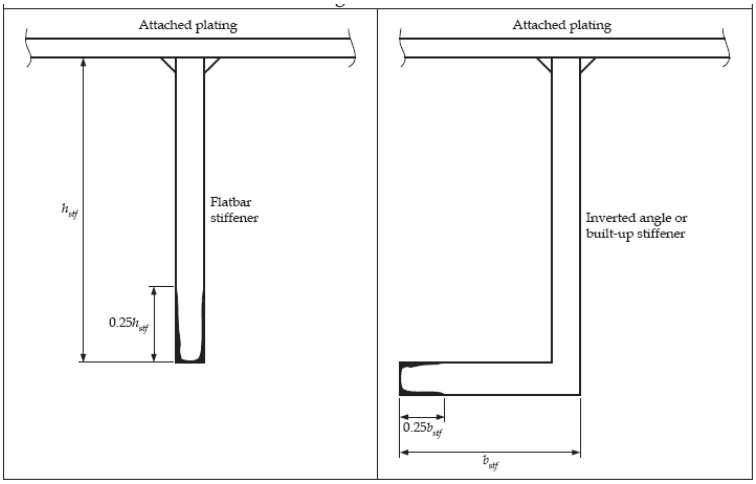


Figure 2 - Edge corrosion

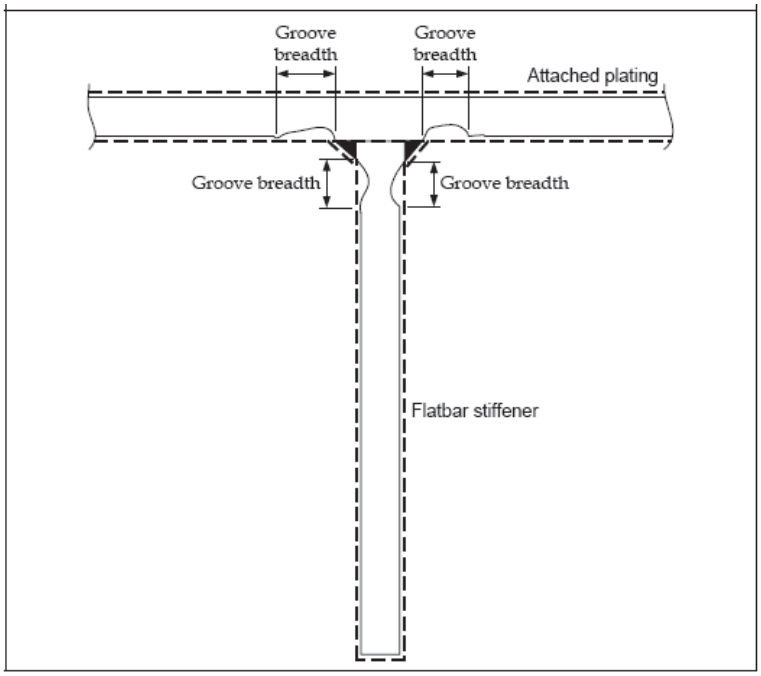


Figure 3 - Grooving corrosion

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

1.5.21 For the application of requirements outlined in [Sections 2, 3, 10 and 4], a general dry cargo ship is a self-propelled ship of 500 gross tones or above, constructed generally with a tween deck and meant to carry solid cargoes. This excludes bulk carriers, roll on-roll-off ships, livestock carriers, refrigerated cargo ships, dock/deck ships and ships dedicatedly used for the carriage of containers, forest products (but not log or timber carriers), cement and wood chips.

1.5.22 **Coating Condition** is defined as follows:
GOOD condition with only minor spot rusting
FAIR condition with local breakdown at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition
POOR condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration

1.5.23 A **Prompt and Thorough Repair** is permanent repair completed at the time of survey to the satisfaction of the Surveyor, so that the need for the imposition of any associated condition of class or recommendation is not there.

1.5.24 **Bulk carriers with hybrid cargo hold arrangements** are to have single skin cargo holds surveyed as per the requirements for single skin bulk carriers and thedouble skin cargo holds surveyed as per the requirements for double skin bulk carriers.

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

1.5.26 **Air pipe heads** installed on the exposed decks are those that extend above the freeboard deck or superstructure decks.

1.5.27 The **Cargo Area or Cargo Length Area** is that part of the ship which contains all cargo holds and adjacent areas including fuel tanks, ballast tanks, cofferdams and void spaces. For oil tankers and chemical tankers, the **Cargo Area** is that part of the ship which contains cargo tanks, slop tanks and cargo/ballast pump-rooms, ballast tanks, cofferdams and void spaces in proximity to cargo tanks and also deck areas throughout the entire length and breadth of the part of the ship over the above mentioned spaces.

1.6 Preparation for survey and means of access

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

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

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

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

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

1.6.6 Casings, ceilings or linings, and loose insulation, where fitted, are to be removed, as required by the Surveyor, for examination of plating and framing. Compositions on plating are to be examined and sounded, but need not be disturbed if found adhering satisfactorily to the plating.

1.6.7 In refrigerated cargo spaces the condition of the coating behind the insulation is to be examined at representative locations. The examination may be limited to verification that the protective coating remains effective and that there are no visible structural defects. Where POOR coating condition is found, the examination is to be extended as deemed necessary by the Surveyor. The condition of the coating is to be reported. If indents, scratches, etc., are detected during surveys of shell

plating from the outside, insulations in way are to be removed as required by the Surveyor, for further examination of the plating and adjacent frames.

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

1.6.9 For survey in cargo holds and water ballast tanks, one or more of the following means for access, acceptable to the Surveyor, is to be provided:
- permanent staging and passages through structures;
- temporary staging and passages through structures;
- hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms;
- boats or rafts;
- other equivalent means.

1.6.10 Thickness measurement is normally to be carried out by means of ultrasonic test equipment. The accuracy of the equipment is to be proven to the Surveyor as required. Thickness measurements are to be carried out by a firm approved by DBS in accordance with Part 1 Chapter 1 Section 3, except that in respect of measurements of non-ESP ships less than 500 gross tonnages and all fishing vessels, the firm need not be so approved

1.6.11 One or more of the following fracture detection procedures may be required if deemed necessary by the Surveyor:
- radiographic equipment;
- ultrasonic equipment;
- magnetic particle equipment;
- dye penetrant.

1.7 Survey Planning Meeting

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

1.7.2 Prior to commencement of any part of the renewal and intermediate survey, a survey planning meeting is to be held between the attending surveyor(s), the owner's representative in attendance, the thickness measurement company operator (as applicable) and the master of the ship or an appropriately qualified representative appointed by the master or Company for the purpose to ascertain that all the arrangements envisaged in the survey programme are in place, so as to ensure the safe and efficient conduct of the survey work to be carried out.

1.7.3 The following is an indicative list of items that are to be addressed in the meeting:
- schedule of the vessel (i.e. the voyage, docking and undocking manoeuvres, periods alongside, cargo and ballast operations, etc.);
- provisions and arrangements for thickness measurements (i.e. access, cleaning/de-scaling, illumination, ventilation, personal safety);
- extent of the thickness measurements;
- acceptance criteria (refer to the list of minimum thicknesses);
- extent of close-up survey and thickness measurement considering the coating condition and suspect areas/areas of substantial corrosion;
- execution of thickness measurements;
- taking representative readings in general and where uneven corrosion/pitting is found;
- mapping of areas of substantial corrosion;
- communication between attending surveyor(s) the thickness measurement
- company operator(s) and owner representative(s) concerning findings.

1.8 Repairs

1.8.1 Any damage in association with wastage over the allowable limits (including buckling, grooving, detachment or fracture), or extensive areas of wastage over the allowable limits, which affects or, in the opinion of the Surveyor, **will** affect the vessel's structural, watertight or weathertight integrity, is to be **promptly and thoroughly** (see 1.5.23) repaired. Areas to be considered include:
- bottom structure and bottom plating;
- side structure and side plating;
- deck structure and deck plating;
- watertight or oiltight bulkheads;
- hatch covers or hatch coamings, where fitted.

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

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

1.8.3 Where the damage found on structure mentioned in Par. 1.8.1 is isolated and of a localised nature which does not affect the ship's structural integrity, consideration may be given by the DBS surveyor to allow an appropriate temporary repair to restore watertight or weather tight integrity and impose a Recommendation/Condition of DBS Class in accordance with the below para. 19, with a specific time limit.

1.9 Imposing a Recommendation/Condition of DBS Class

1.9.1 Recommendations/Conditions of Class shall be imposed for the following:
- Repairs and/or renewals related to damages that affect Classification (e.g. grounding, structural damages, machinery damages, wastage over the allowable limits, etc.)
- Supplementary survey requirements
- Temporary repairs

1.9.2 For repairs not completed at the time of survey, a Recommendation/Condition of DBS Class is to be imposed. In order to provide adequate information to the surveyor attending for survey of the repairs, the Recommendation/Condition of DBS Class is to be sufficiently detailed with identification of items to be repaired. For identification of extensive repairs, reference may be given to the survey report.

1.9.3 Recommendations/Conditions of DBS Class may require imposing limitations related to navigation and operation that are deemed necessary for continued operation under DBS Classification (e.g. loss of anchor and/or chain, etc).

1.9.4 Recommendations/Conditions of DBS Class shall be given in writing with a time limit for completion to the owner's representatives/Ship's Master, and are to be clearly stated on the Certificate of DBS Class or an attachment to the Certificate of DBS Class and/or class survey status or report.

1.9.5 Owners will be notified of these dates and that the vessel's class will be subject to a suspension procedure if the item is not dealt with, or postponed, by the due date.

1.9.6 Clearance of Recommendations/Conditions of Class shall be supported by a survey report giving details of all associated repairs and/or renewals, or of the supplemental surveys carried out. Repairs carried out shall be reported with identification of:
- Compartment and location
- Structural member
- Repair method
- Repair extent
- NDT/Tests

1.9.7 Partially dealt with Recommendations/Conditions of Class shall be supported by a survey report giving details of repairs and/or renewals, or of that part of the supplemental surveys carried out and those parts remaining outstanding.

Section 2 – Annual Surveys (Hull and Machinery)

2.1 General requirements

2.1.1 Annual Surveys are to be held within 3 months before or after anniversary date from the date of the initial classification survey or of the date credited for the last Special Survey.

2.1.2 An annual survey should enable the Administration to verify that the condition of the ship, its machinery and equipment is being maintained in accordance with the relevant requirements. Annual Surveys are to be concurrently executed alongside statutory, annual or other relevant statutory surveys, wherever feasible.

2.1.3 In general, the scope of the annual survey should be as follows:

- It should consist of a certificate examination, a visual examination of a sufficient extent of the ship and its equipment, and certain tests to confirm that their condition is being properly maintained;
- it should also include a visual examination to confirm that no unapproved modifications have been made to the ship and its equipment;
- the content of each annual survey is given in the respective guidelines. The thoroughness and stringency of the survey should depend upon the condition of the ship and its equipment; and
- should any doubt arise as to the maintenance of the condition of the ship or its equipment, further examination and testing should be conducted as considered necessary.

2.1.4 Where an annual survey is not conducted within the expected time survey certificates lose their validity. The validity of the certificate can then be restored by carrying out the appropriate survey which should consist of the requirements of the survey that was not carried out.

2.2 Applicability of the survey

2.2.1 The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull, hatch covers, hatch coamings, closing appliances, equipment and related piping are maintained in a satisfactory condition.

2.2.2 Examination of weather decks, ship side plating above water line, hatch covers and coamings.

2.2.3 Confirmation is to be obtained that no unapproved changes have been made to the hatch covers, hatch coamings and their securing and sealing devices since the last survey.

2.2.4 Where mechanically operated steel covers are fitted, checking the satisfactory conditions, as applicable, of:

- hatch covers;
- tightness devices of longitudinal, transverse and intermediate cross junctions (gaskets, gasket lips, compression bars, drainage channels);
- clamping devices, retaining bars, cleating;
- chain or rope pulleys;
- guides;
- guide rails and track wheels;
- stoppers, etc.;
- wires, chains, gypsies, tensioning devices;
- hydraulic system essential to closing and securing;
- safety locks and retaining devices.

Where portable covers, wooden or steel pontoons are fitted, checking the satisfactory condition where applicable, of:

- wooden covers and portable beams, carriers or sockets for the portable beam, and their securing devices;
- steel pontoons,
- tarpaulins;
- cleats, battens and wedges;

- - hatch securing bars and their securing devices;
- - loading pads/bars and the side plate edge;
- - guide plates and chocks;
- - compression bars, drainage channels and drain pipes (if any).

2.2.5 Checking the satisfactory condition of hatch coaming plating and their stiffeners, where applicable.

2.2.6 Random checking of the satisfactory operation of mechanically operated hatch covers is to be made including:
- stowage and securing in open condition;
- proper fit and efficiency of sealing in closed condition;
- operational testing of hydraulic and power components, wires, chains, and link drives.

2.2.7 Examination of the weld connection between air pipes and deck plating.

2.2.8 External examination of all air pipe heads installed on the exposed decks.

2.2.9 Examination of flame screens on vents to all bunker tanks.

2.2.10 Examination of ventilators, including closing devices, if any.

2.2.11 Suspect Areas

Suspect Areas identified at previous surveys are to be examined. Thickness measurements are to be taken of the areas of substantial corrosion and the extent of thickness measurements is to be increased to determine areas of substantial corrosion. Table 1 may be used as guidance for these additional thickness measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

Note: these requirements are not applicable to cargo tanks of oil tankers, chemical tankers and double hull oil tankers, surveyed in accordance with of Ch 3/Sec 6 & Sec 7 of this Part.

2.2.12 Examination of Ballast Tanks

2.2.12.1 Examination of ballast tanks when required as a consequence of the results of the Special Survey and Intermediate Survey is to be carried out. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements is to be increased to determine areas of substantial corrosion. Table 1 may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

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

Table 1: Guidance for Additional Thickness Measurements in Way of Substantial Corrosion

2.3 Loadline issues

2.3.1 Checking, in general, that there has been no deterioration in the strength of the hull.

2.3.2 Checking of the positions of the deck line and load line which, if necessary, are to be re-marked and re-painted.

2.3.3 Checking that no alterations have been made to the hull or superstructures that would affect the calculations determining the position of the load lines.

2.3.4 Examining the superstructure end bulkheads and the openings therein.

2.3.5 Examining the means of securing the weather tightness of cargo hatchways, other hatchways and other openings on the freeboard and superstructure decks.

2.3.6 Examining the ventilators and air pipes, including their coamings and closing appliances.

2.3.7 Examining the watertight integrity of the closures to any openings in the ship's side below the freeboard deck.

2.3.8 Examining the scuppers, inlets and discharges.

2.3.9 Examining the garbage chutes.

2.3.10 Examining the means provided to minimize water ingress through the spurling pipes and chain lockers.

2.3.11 Examining the side scuttles and deadlights.

2.3.12 Examining the bulwarks including the provision of freeing ports, special attention being given to any freeing ports fitted with shutters.

2.3.13 Examining the guardrails, gangways, walkways and other means provided for the protection of the crew and means for safe passage of crew.

2.3.14 Examining the special requirements for ships permitted to sail with type "A" or type "B-minus" freeboards.

2.3.15 Checking, when applicable, the fittings and appliances for timber deck cargoes.

2.4 Hull issues

2.4.1 Examining, in general and as far as can be seen, the hull and its closing appliances.

2.4.2 Examining the anchoring and mooring equipment as far as can be seen. For ships built after 01/01/2007, confirming that the towing and mooring equipment is properly marked with any restriction associated with its safe operation.

2.4.3 Examining, for bulk carriers of 150 m and above, where appropriate, the ship's structure in accordance with the Ship Construction File, taking into account identified areas that need special attention.

2.4.4 Examining the collision and the other watertight bulkheads as far as can be seen.

2.4.5 Examining and testing (locally and remotely) all the watertight doors in watertight bulkheads.

2.4.6 Examining the arrangements for closing openings in the shell plating below the freeboard deck.

2.4.7 Examining each bilge pump and confirming that the bilge pumping system for each watertight compartment is satisfactory.

2.4.8 Confirming that the drainage from enclosed cargo spaces situated on the freeboard deck is satisfactory.

2.4.9 Examining visually the drainage facilities for blockage or other damage and confirming the provision of means to prevent blockage of drainage arrangements, for closed vehicle and ro-ro spaces and special category spaces where fixed pressure water-spraying systems are used.

2.4.10 Confirming, when appropriate and as far as is practicable when examining internal spaces on oil tankers and bulk carriers, that the means of access to cargo and other spaces remain in good condition.

2.4.11 Examining the functionality of bilge well alarms to all cargo holds and conveyor tunnels.

2.4.12 For bulk carriers, examining the hold, ballast and dry space water level detectors and their audible and visual alarms.

2.4.13 For bulk carriers, checking the arrangements for availability of draining and pumping systems forward of the collision bulkhead.

2.4.14 For single hull, single hold cargo ships, examining the cargo hold water level detector and its audible and visual alarm.

2.5 Machinery and Electrical issues

2.5.1 Confirming that the machinery, boilers and other pressure vessels, associated piping systems and fittings are installed and protected so as to reduce to a minimum any danger to persons on board, due regard being given to moving parts, hot surfaces and other hazards.

2.5.2 Confirming that the normal operation of the propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative.

2.5.3 Confirming that means are provided so that the machinery can be brought into operation from the dead ship condition without external aid.

2.5.4 Carrying out a general examination of the machinery, the boilers, all steam, hydraulic, pneumatic and other systems and their associated fittings to see whether they are being properly maintained and with particular attention to the fire and explosion hazards.

2.5.5 Examining and testing the operation of main and auxiliary steering arrangements, including their associated equipment and control systems.

2.5.6 Confirming that the means of communication between the navigation bridge and steering gear compartment and the means of indicating the angular position of the rudder are operating satisfactorily.

2.5.7 Confirming that with ships having emergency steering positions there are means of relaying heading information and, when appropriate, of supplying visual compass readings to the emergency steering position.

2.5.8 Confirming that the various alarms required for hydraulic power-operated, electric and electro-hydraulic steering gears are operating satisfactorily and that the re-charging arrangements for hydraulic power-operated steering gears are being maintained.

2.5.9 Examining the means for the operation of the main and auxiliary machinery essential for the propulsion and the safety of the ship, including, when applicable, the means of remotely controlling the propulsion machinery from the navigating bridge (including the control, monitoring, reporting, alert and safety actions) and the arrangements to operate the main and other machinery from a machinery control room.

2.5.10 Confirming the operation of the ventilation for the machinery spaces.

2.5.11 Confirming that the engine room telegraph, the second means of communication between the navigation bridge and the machinery space and the means of communication with any other positions from which the engines are controlled are operating satisfactorily.

2.5.12 Confirming that the engineer's alarm is clearly audible in the engineers' accommodation.

2.5.13 Examining, as far as practicable, visually and in operation, the electrical installations, including the main source of power and the lighting systems.

2.5.14 Confirming, as far as practicable, the operation of the emergency source(s) of electrical power including their starting arrangements, the systems supplied and, when appropriate, their automatic operation.

2.5.15 Examining, in general, that the precautions provided against shock, fire and other hazards of electrical origin are being maintained.

2.5.16 Examining the arrangements for periodically unattended machinery spaces and, in particular, the random testing of alarm, automatic and shutdown functions.

2.5.17 Examining, where applicable, the alternative design and arrangements for machinery or electrical installations, or fire safety, in accordance with the test, inspection and maintenance requirements, if any, specified in the approved documentation.

2.5.18 Confirming, as far as practicable, that no changes have been made in the structural fire protection, examining any manual and automatic fire doors and proving their operation, testing the means of closing the main inlets and outlets of all ventilation systems and testing the means of stopping power ventilation systems from outside the space served.

2.5.19 Confirming that the means of escape from accommodation, machinery and other spaces are satisfactory.

2.5.20 Examining visually the condition of any expansion joints in seawater systems.

2.6 Firefighting system

2.6.1 Examining the fire pumps, fire main, hydrants, hoses and nozzles and the international shore connection and checking that each fire pump, including the emergency fire pump, can be operated separately so that two jets of water are produced simultaneously from different hydrants at any part of the ship whilst the required pressure is maintained in the fire main.

2.6.2 Checking the provision and randomly examining the condition of the portable and non-portable fire extinguishers. confirming that the firefighters' outfits including its self-contained compressed air breathing apparatus and emergency escape breathing devices (EEBDs) are complete and in good condition, that the cylinders, including the spare cylinders, of any required self-contained breathing apparatus are suitably charged, and that on board means of recharging breathing apparatus cylinders used during drills or a suitable number of spare cylinders to replace those used are provided, and provision of two-way portable radiotelephone apparatus of an explosion proof type or intrinsically safe.

2.6.3 Checking the operational readiness and maintenance of firefighting systems.

2.6.4 Examining the fixed firefighting system for the machinery, cargo, vehicle, special category and ro-ro spaces, as appropriate, and confirming that its means of operation is clearly marked.

2.6.5 Examining the fire-extinguishing and special arrangements in the machinery spaces and confirming, as far as practicable and as appropriate, the operation of the remote means of control provided for the opening and closing of the skylights, the release of smoke, the closure of the funnel and ventilation openings, the closure of power operated and other doors, the stopping of ventilation and boiler forced and induced draft fans and the stopping of oil fuel and other pumps that discharge flammable liquids.

2.6.6 Checking that fixed carbon dioxide fire-extinguishing systems for the protection of machinery spaces and cargo pump-rooms, where applicable, are provided with two separate controls, one for opening of the gas piping and one for discharging the gas from the storage container, each of them located in a release box clearly identified for the particular space.

2.6.7 Examining, as far as possible, and testing, as feasible, any fire detection and alarm system and any sample extraction smoke detection system.

2.6.8 Examining the fire-extinguishing systems for spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces.

2.6.9 Examining the helicopter facilities.

2.6.10 Examining the arrangements for remote closing of valves for oil fuel, lubricating oil and other flammable oils and confirming, as far as practicable and as appropriate, the operation of the remote means of closing the valves on the tanks that contain oil fuel, lubricating oil and other flammable oils.

2.6.11 examining and testing of the general emergency alarm system.

2.6.12 Examining the fire protection arrangements in cargo, vehicle and ro-ro spaces and confirming, as far as practicable and as appropriate, the operation of the means of control provided for closing the various openings.

2.6.13 Examining, where applicable, the alternative design and arrangements for fire safety or life-saving appliances and arrangements, in accordance with the test, inspection and maintenance requirements, if any, specified in the approved documentation. This check refers only to the firefighting protection.

2.6.14 Examining, when appropriate, the special arrangements for carrying dangerous goods, including checking the electrical equipment and wiring, the ventilation, the provision of protective clothing and portable appliances and the testing of the water supply, bilge pumping and any water spray system.

2.7 Oil tanker additional items

2.7.1 Checking the deck foam system, including the supplies of foam concentrate and testing that the minimum number of jets of water at the required pressure in the fire main is obtained (see Ch 3/Sec 6.5 of this Part) when the system is in operation.

2.7.2 Examining the inert gas system, and in particular:

2.7.2.1 examining externally for any sign of gas or effluent leakage,

2.7.2.2 confirming the proper operation of both inert gas blowers,

2.7.2.3 observing the operation of the scrubber-room ventilation system,

2.7.2.4 checking the deck water seal for automatic filling and draining,

2.7.2.5 examining the operation of all remotely operated or automatically

2.7.2.6 controlled valves and, in particular, the flue gas isolating valves,

2.7.2.7 observing a test of the interlocking feature of soot blowers,

2.7.2.8 observing that the gas pressure regulating valve automatically closes when the inert gas blowers are secured,

2.7.2.9 checking, as far as practicable, the following alarms and safety devices of the inert gas system using simulated conditions where necessary:

- high oxygen content of gas in the inert gas main,
- low gas pressure in the inert gas main,
- low pressure in the supply to the deck water seal,
- high temperature of gas in the inert gas main,
- low water pressure or low water-flow rate,
- accuracy of portable and fixed oxygen-measuring equipment by means of calibration gas,
- high water level in the scrubber,
- failure of the inert gas blowers,
- failure of the power supply to the automatic control system for the gas regulating valve and to the instrumentation for continuous indication and permanent recording of pressure and oxygen content in the inert gas main,

- high pressure of gas in the inert gas main.

2.7.3 Checking, when practicable, the proper operation of the inert gas system on completion of the checks listed above.

2.7.4 Examining the fixed firefighting system for the cargo pump rooms and confirming, as far as practicable and when appropriate, the operation of the remote means for closing the various openings.

2.7.5 Checking for all tankers, the provision of at least one portable instrument for measuring oxygen and one for measuring flammable vapour concentrations, together with a sufficient set of spares, and suitable means for the calibration of these instruments.

2.7.6 Examining the arrangements for gas measurement in double-hull spaces and double bottom spaces, including the fitting of permanent gas sampling lines, where appropriate.

2.7.7 Examining, as far as possible, and testing the fixed hydrocarbon gas detection system.

2.7.8 Checking protection of cargo pump room, and in particular:
- checking temperature sensing devices for bulkhead glands and alarms,
- checking interlock between lighting and ventilation,
- checking gas detection system,
- checking bilge level monitoring devices and alarms.

2.7.9 Confirming, when appropriate, that the requisite arrangements to regain steering capability in the event of the prescribed single failure are being maintained.

2.7.10 Examining the cargo tank openings, including gaskets, covers, coamings and screens,

2.7.11 Examining the cargo tank pressure/vacuum valves and devices to prevent the passage of flame,

2.7.12 Examining the devices to prevent the passage of flame on vents to all bunker, oily-ballast and oily-slop tanks and void spaces, as far as practicable,

2.7.13 Examining the cargo tank venting, cargo tank purging and gas-freeing and other ventilation systems,

2.7.14 Examining the cargo, crude oil washing, ballast and stripping systems both on deck and in the cargo pump rooms and the bunker system on deck,

2.7.15 Confirming that all electrical equipment in dangerous zones is suitable for such locations, is in good condition and is being properly maintained,

2.7.16 Confirming that potential sources of ignition in or near the cargo pump room are eliminated, such as loose gear, combustible materials, etc., that there are no signs of undue leakage and that access ladders are in good condition;

2.7.17 Examining all pump room bulkheads for signs of oil leakage or fractures and, in particular, the sealing arrangements of all penetrations of cargo pump room bulkheads,

2.7.18 examining, as far as practicable, the cargo, bilge, ballast and stripping pumps for undue gland seal leakage, verification of proper operation of electrical and mechanical remote operating and shutdown devices and operation of cargo pump room bilge system, and checking that pump foundations are intact,

2.7.19 Confirming that the pump room ventilation system is operational, ducting intact, dampers are operational and screens clean,

2.7.20 Verifying that installed pressure gauges on cargo discharge lines and level indicator systems are operational,

2.7.21 Examining access to bow arrangement,

2.7.22 Examining the towing arrangement for tankers of not less than 20,000 tonnes deadweight,

2.7.23 Confirming that the corrosion prevention system fitted to dedicated ballast water tanks of oil tankers and bulk carriers when appropriate is maintained,

2.7.24 Confirming that the coating system in cargo oil tanks of crude oil tankers, when appropriate, is maintained and that in-service maintenance and repair activities are recorded in the coating technical file,

2.7.25 Examining the emergency lighting in all cargo pump rooms of tankers constructed after 1 July 2002,

2.7.26 Examining, for oil tankers of 150 m in length and above, where appropriate, the ship's structure in accordance with the Ship Construction File, taking into account identified areas that need special attention.

2.8 Chemical tanker additional items

2.8.1 For the hull, machinery and equipment of cargo ships, concerning the additional requirements for chemical tankers, the annual survey should consist of the provisions mentioned above and (see Ch 3/Sec 7.6 of this Part).

2.8.2 Confirming that wheelhouse doors and windows, side scuttles and windows in superstructure and deckhouse ends facing the cargo area are in a satisfactory condition,

2.8.3 Confirming that potential sources of ignition in or near the cargo pump room are eliminated, such as loose gear, combustible materials, etc., that there are no signs of undue leakage and that access ladders are in a satisfactory condition,

2.8.4 Confirming that removable pipe lengths or other approved equipment necessary for cargo separation are available in the pump room and are in a satisfactory condition,

2.8.5 Examining all pump room bulkheads for signs of cargo leakage or fractures and, in particular, the sealing arrangements of all penetrations of pump room bulkheads,

2.8.6 Confirming that the remote operation of the cargo pump bilge system is satisfactory,

2.8.7 Examining the bilge and ballast arrangements and confirming that pumps and pipelines are identified,

2.8.8 Confirming, when applicable, that the bow or stern loading and unloading arrangements are in order and testing the means of communication and the remote shut down for the cargo pumps,

2.8.9 Examining the cargo transfer arrangements and confirming that any hoses are suitable for their intended purpose and, where appropriate, type-approved or marked with date of testing,

2.8.10 Examining, when applicable, the cargo heating or cooling systems, including any sampling arrangements, and confirming that the means for measuring the temperature and associated alarms are operating satisfactorily,

2.8.11 Examining, as far as practicable, the cargo tank vent system, including the pressure/vacuum valves and secondary means to prevent over- or under-pressure and devices to prevent the passage of flame,

2.8.12 Examining the gauging devices, high-level alarms and valves associated with overflow control,

2.8.13 Confirming that arrangements for sufficient gas to be carried or generated to compensate for normal losses, and that the means provided for monitoring ullage spaces, are satisfactory,

2.8.14 Confirming that arrangements are made for sufficient medium to be carried where drying agents are used on air inlets to cargo tanks,

2.8.15 Confirming that all electrical equipment in dangerous zones is suitable for such locations, is in satisfactory condition and has been properly maintained,

2.8.16 Examining the fixed firefighting system for the cargo pump room and the deck foam system for the cargo area and confirming that their means of operation are clearly marked,

2.8.17 Confirming that the condition of the portable fire extinguishing equipment for the cargoes to be carried in the cargo area is satisfactory,

2.8.18 Confirming that the system for continuous monitoring of the concentration of flammable vapours is satisfactory,

2.8.19 Examining, as far as practicable, and confirming the satisfactory operation of, the arrangements for the ventilation of spaces normally entered during cargo handling operations and other spaces in the cargo area,

2.8.20 Confirming, as far as practicable, that the intrinsically safe systems and circuits used for measurement, monitoring, control and communication purposes in all hazardous locations are being properly maintained,

2.8.21 Examining the equipment for personnel protection (IBC Code 83/90/00, ch.14) (BCH Code 85/90/00 ch.IIIF) and in particular that:

2.8.21.1 the protective clothing for crew engaged in loading and discharging operations and its stowage is in a satisfactory condition;

2.8.21.2 the required safety equipment and associated breathing apparatus and associated air supplies and, when appropriate, emergency-escape respiratory and eye protection, are in a satisfactory condition and are properly stowed;

2.8.21.3 medical first-aid equipment, including stretchers and oxygen resuscitation equipment are in a satisfactory condition;

2.8.21.4 arrangements have been made for the antidotes for the cargoes actually carried to be on board;

2.8.21.5 decontamination arrangements and eyewashes are operational;

2.8.21.6 the required gas detection instruments are on board and arrangements have been made for the supply of the appropriate vapour detection tubes;

2.8.21.7 the arrangements for the stowage of cargo samples are satisfactory;

2.8.22 confirming that sampling points or detector heads are located in suitable positions in order that potentially dangerous leakages are readily detected.

2.9 Gas carrier additional items

2.9.1 For the hull, machinery and equipment of cargo ships, concerning the additional requirements for Gas Carriers, the annual survey should consist of the provisions mentioned above and (see Ch 3/Sec 8.6 of this Part).

2.9.2 Confirming that any special arrangements to survive conditions of damage are in order.

2.9.3 Confirming that the wheelhouse doors and windows, side scuttles and windows in superstructure and deckhouse ends in the cargo area are in a satisfactory condition,

2.9.4 Examining the cargo pump rooms and cargo compressor rooms,

2.9.5 Confirming that the manually operated emergency shutdown system together with the automatic shutdown of the cargo pumps and compressors are satisfactory,

2.9.6 Examining the cargo control room,

2.9.7 Examining the gas detection arrangements for cargo control rooms and the measures taken to exclude ignition sources where such spaces are not gas-safe,

2.9.8 Confirming the arrangements for the air locks are being properly maintained,

2.9.9 Examining, as far as practicable, the bilge, ballast and oil fuel arrangements,

2.9.10 Examining, when applicable, the bow or stern loading and unloading arrangements with particular reference to the electrical equipment, firefighting arrangements and means of communication between the cargo control room and the shore location,

2.9.11 Confirming that the sealing arrangements at the gas domes are satisfactory,

2.9.12 Confirming that portable or fixed drip trays or deck insulation for cargo leakage is in order,

2.9.13 Examining the cargo and process piping, including the expansion arrangements, insulation from the hull structure, pressure relief and drainage arrangements,

2.9.14 Confirming that the cargo tank and inter-barrier space pressure and relief valves, including safety systems and alarms, are satisfactory,

2.9.15 Confirming that any liquid and vapour hoses are suitable for their intended purpose and, where appropriate, type-approved or marked with date of testing,

2.9.16 Examining the arrangements for the cargo pressure/temperature control including, when fitted, any refrigeration system and confirming that any associated alarms are satisfactory,

2.9.17 Examining the cargo, bunker, ballast and vent piping systems, including vent masts and protective screens, as far as practicable,

2.9.18 Confirming that arrangements are made for sufficient inert gas to be carried to compensate for normal losses and that means are provided for monitoring the spaces,

2.9.19 Confirming that the use of inert gas has not increased beyond that needed to compensate for normal losses by examining records of inert gas usage,

2.9.20 Confirming that any air-drying system and any inter-barrier and hold space purging inert gas system are satisfactory,

2.9.21 Confirming that electrical equipment in gas-dangerous spaces and zones is in a satisfactory condition and is being properly maintained,

2.9.22 Examining the arrangements for the fire protection and fire extinction and testing the remote means of starting one main fire pump,

2.9.23 Examining the fixed firefighting system for the cargo pump room and confirming that its means of operation is clearly marked,

2.9.24 Examining the water spray system for cooling, fire protection and crew protection and confirming that its means of operation is clearly marked,

2.9.25 Examining the dry chemical powder fire-extinguishing system for the cargo area and confirming that its means of operation is clearly marked,

2.9.26 Examining the fixed installation for the gas-dangerous spaces and confirming its means of operation is clearly marked,

2.9.27 Examining, as far as practicable, and confirming the satisfactory operation of, the arrangements for the mechanical ventilation of spaces in the cargo area normally entered during cargo handling operations,

2.9.28 Examining, and confirming the satisfactory operation of, the arrangements for the mechanical ventilation of spaces normally entered other than those in spaces of the cargo area normally entered during cargo handling operations,

2.9.29 Examining, and testing as appropriate and as far as practicable, the liquid level indicators, overflow control, pressure gauges, high pressure and, when applicable, low pressure alarms, and temperature indicating devices for the cargo tanks,

2.9.30 Examining, and testing as appropriate, the gas detection equipment.

Section 3 – Intermediate Surveys (Hull and Machinery)

3.1 General requirements

3.1.1 An intermediate survey is an inspection of specified items relevant to the particular certificate to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended.

3.1.2 The Intermediate Surveys include the execution of the Annual Survey items as described in previous SECTION 2 with the addition of the inspections described in the herein paragraphs.

3.1.3 The Intermediate Survey is to be carried out either at or between the second and third Annual Survey and should take the place of one of the annual surveys.

3.1.4 The intermediate survey should be an inspection of items relevant to the particular certificate to ensure that they are in a satisfactory condition and are fit for the service for which the ship is intended.

3.1.5 When specifying items of hull and machinery for detailed examination, due account should be taken of any continuous survey schemes that may be applied by classification societies.

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

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

3.1.8 Where an intermediate survey has not been carried out within the due dates, the certificate of the ship ceases to be valid. The validity of the certificate should be restored by carrying out the appropriate survey which, in such circumstances, should consist of the requirements of the survey that was not carried out, but its thoroughness and stringency should have regard to the time this survey was allowed to lapse.

3.2 Applicability of the survey

3.2.1 The scope of the second or third Annual Survey is to be extended to include the following:

3.2.1.1 For ships between 5 and 10 years of age, a general, internal examination of representative ballast tanks is to be carried out. If there is no hard protective coating, soft or semi-hard coating, or POOR coating condition, the examination is to be extended to other ballast spaces of the same type.

3.2.1.2 For ships over 10 years of age, a general, internal examination of all spaces used for water ballast is to be carried out.

3.2.2 If such examinations reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains effective.

3.2.3 For ballast tanks, excluding double bottom ballast tanks, if there is no hard protective coating, soft or semi-hard coating, or POOR coating condition and it is not renewed, the spaces in question are to be internally examined at annual intervals.

3.2.4 When such conditions are found in water ballast double bottom tanks, the spaces in question may be internally examined at annual intervals.

3.2.5 In the case of dry cargo ships over 15 years old, other than bulk carriers subject to Ch 3/Sec 6 of this Part or general dry cargo ships subject to Ch 3/Se 26 of this Part, an internal examination of selected cargo holds is to be carried out.

3.2.6 In the case of ships over 10 years of age, other than ships engaged in the carriage of dry cargoes only or ships subject to Ch 3/Sec 6, Sec 7 & Sec 8 of this Part, an internal examination of selected cargo spaces is to be carried out.

3.3 Requirements for ballast tanks and cargo spaces

3.3.1 For ships over 5 years of age, an internal examination of representative spaces used for water ballast.

3.3.2 For ships over 10 years of age, other than gas carriers and ships engaged in the carriage of dry cargoes only, an internal examination of selected cargo spaces.

3.4 Oil tanker additional items

3.4.1 Should there be any doubt as to its condition when examining the various piping systems, the piping may be required to be pressure tested, gauged or both. Particular attention is to be paid to repairs such as welded doublers.

3.4.2 For ships over 10 years of age an internal examination of selected cargo spaces.

3.4.3 Testing the insulation resistance of electrical circuits in dangerous zones such as cargo pump rooms and areas adjacent to cargo tanks, but in cases where a proper record of testing is maintained, consideration should be given to accepting recent readings.

3.5 Chemical tanker additional items

3.5.1 Examination of vent line drainage arrangements.

3.5.2 Confirmation, where applicable, that pipelines and independent cargo tanks are electrically bonded to the hull.

3.5.3 Generally examining the electrical equipment and cables in dangerous zones such as cargo pump rooms and areas adjacent to cargo tanks to check for defective equipment, fixtures and wiring. The insulation resistance of the circuits should be tested and in cases where a proper record of testing is maintained, consideration should be given to accepting recent readings.

3.6 Gas carrier additional items

3.6.1 Confirming, where applicable, that pipelines and independent cargo tanks are electrically bonded to the hull.

3.6.2 Generally examining the electrical equipment and cables in dangerous zones such as cargo pump rooms and areas adjacent to cargo tanks to check for defective equipment, fixtures and wiring. The insulation resistance of the circuits should be tested and in cases where a proper record of testing is maintained consideration should be given to accepting recent readings.

3.6.3 Confirming that the heating arrangements, if any, for steel structures are satisfactory.

Section 4 – Special Surveys (Hull and Machinery)

4.1 General requirements

4.1.1 Special Surveys are to be carried out at 5 years' intervals to renew the Classification Certificate.

4.1.2 The first Special Survey is to be completed within 5 years from the date of the initial classification survey and thereafter 5 years from the credited date of the previous Special Survey. However, an extension of class of 3 months' maximum beyond the 5th year can be granted in exceptional circumstances.

4.1.3 In this case, the next period of class will start from the expiry date of the Special Survey before the extension was granted.

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

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

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

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

4.1.8 The Special Survey is to include, in addition to the requirements of the Annual Survey, examination, tests and checks of sufficient extent to ensure that the hull, equipment and related piping, as required in **4.1.18**, are in satisfactory condition and fit for the intended purpose for the new period of class of five years to be assigned, subject to proper maintenance and operation and the periodical surveys being carried out at the due dates.

4.1.9 The examinations of the hull are to be supplemented by thickness measurements and testing as required in **4.1.17** and **4.1.18**, to ensure that the structural integrity remains effective. The aim of the examination is to discover Substantial Corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.

4.1.10 The Special Survey is to include examination of underwater parts per **Section 10** of current **Chapter 3**.

4.1.11 The anchors and chain cables are to be ranged, examined and the required complement and condition verified. The chain locker, holdfasts, hawse pipes and chain stoppers are to be examined and pumping arrangements of the chain locker tested. At Special Survey No.2 and subsequent Special Surveys, chain cables are to gauged and renewed in cases where their mean diameter is worn below the limits allowed by the Society.

4.1.12 All spaces including holds and their 'tween decks where fitted; double bottom, deep, ballast, peak and cargo tanks; pumprooms, pipe tunnels, duct keels, machinery spaces, dry spaces, cofferdams and voids are to be internally examined including the plating and framing, bilges and drain wells, sounding, venting, pumping and drainage arrangements. Internal examination of fuel oil, lube oil and fresh water tanks is to be carried out in accordance with Table 3. The aim of the examination is to discover Substantial Corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.

4.1.13 Engine room structure is to be examined. Particular attention is to be given to tank tops, shell plating in way of tank tops, brackets connecting side shell frames and tank tops, and engine room bulkheads in way of tank top and bilge wells. Particular attention is to be given to the sea suctions, sea water cooling pipes and overboard discharge valves and their connections to the shell plating. Where wastage is evident or suspect, thickness measurements are to be carried out, and renewals or repairs made when wastage exceeds allowable limits.

4.1.14 Where provided, the condition of corrosion prevention system of ballast tanks is to be examined. For ballast tanks, excluding double bottom tanks, where a hard protective coating is found in POOR condition and it is not renewed, where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from time of construction, the tanks in

question are to be examined at annual intervals. Thickness measurements are to be carried out as deemed necessary by the surveyor.

4.1.15 When such breakdown of hard protective coating is found in double bottom ballast tanks and it is not renewed, where a soft or semi-hard coating has been applied, or where a hard protective coating was not applied from the time of construction, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.

4.1.16 Boundaries of double-bottom, deep, ballast, peak, and other tanks, including holds adapted for the carriage of salt water ballast, are to be tested with a head of liquid to the top of air pipes or to near the top of hatches for ballast/cargo holds. Boundaries of fuel oil, lube oil and fresh water tanks are to be tested with a head of liquid to the highest point that liquid will rise under service conditions. Tank testing of fuel oil, lube oil and fresh water tanks may be specially considered based on a satisfactory external examination of the tank boundaries, and a confirmation from the Master stating that the pressure testing has been carried out according to the requirements with satisfactory results. The Surveyor may extend the testing as deemed necessary.

4.1.17 Hatch Covers and Coamings The hatch covers and coamings are to be surveyed as follows:

4.1.17.1 A thorough inspection of weather decks, ship side plating above water line, hatch covers and coamings, including close-up survey of hatch cover plating and hatch coaming plating, is to be carried out. Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey shall be done of accessible parts of hatch covers structures.

4.1.17.2 Checking of the satisfactory operation of all mechanically operated hatch covers is to be made, including:
- stowage and securing in open condition;
- proper fit and efficiency of sealing in closed conditions;
- operational testing of hydraulic and power components, wires, chains and link drives.

4.1.17.3 Checking the effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent is to be carried out.

4.1.18 Thickness measurements are to be carried out in accordance with Table 1. The Surveyor may extend the thickness measurements as deemed necessary. When thickness measurements indicate substantial corrosion, the extent of thickness measurements is to be increased to determine areas of substantial corrosion. Table 2 may be used as guidance for these additional thickness measurements. These extended thickness measurements are to be carried out before the survey is credited as completed.

4.1.19 All bilge and ballast piping systems are to be examined and operationally tested to working pressure to attending Surveyor's satisfaction to ensure that tightness and condition remain satisfactory.

4.1.20 For all ships except for passenger ships, automatic air pipe heads are to be completely examined (both externally and internally) as indicated in Table 4. For designs where the inner parts cannot be properly inspected from outside, this is to include removal of the head from the air pipe. Particular attention is to be paid to the condition of the zinc coating in heads constructed from galvanised steel.

4.2 Dry Dock Survey

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

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

Special Survey No.1 Age < 5	**Special Survey No.2 5 < Age <10**	**Special Survey No.3 10 < Age <15**	**Special Survey No.4 and Subsequent 15 < Age**
1) Suspect areas throughout the vessel.			
	2) One transverse section of deck plating in way of a cargo space within the amidships 0.5L	2) Two transverse sections within the amidships 0.5L in way of two different cargo spaces.	2) A minimum of three transverse sections in way of cargo spaces within the amidships 0.5L.

		3) All cargo hold hatch covers and coamings (plating and stiffeners).	
		4) Internals in forepeak and afterpeak tanks.	
			5) All exposed main deck plating full length.
			6) Representative exposed superstructure deck plating (poop, bridge, and forecastle deck).
			7) Lowest strake and strakes in way of 'tween decks of all transverse bulkheads in cargo spaces together with internals in way.
			8) All wind - and water strakes, port and starboard, full length.
			9) All keel plates full length. Also, additional bottom plates in way of cofferdams, machinery space, and aft end of tanks.
			10) Plating of seachests. Shell plating in way of overboard discharges as considered necessary by the attending surveyor

Notes
1. Thickness measurement locations are to be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering cargo and ballast history and arrangement and condition of protective coatings.
2. Thickness measurements of internals may be specially considered by the Surveyor if the hard protective coating is in GOOD condition.
3. For ships less than 100 meters in length, the number of transverse sections required at Special Survey No. 3 may be reduced to one (1), and the number of transverse sections required at Subsequent Special Surveys may be reduced to two (2).
4. For ships more than 100 meters in length, at Special Survey No. 3, thickness measurements of exposed deck plating within amidship 0.5 L may be required.
5. Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, thickness measurement shall be done of accessible parts of hatch covers structures.

Table 1: Minimum Requirements for Thickness Measurements at Special Survey

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

Table 2: Guidance for Additional Thickness Measurements in Way of Substantial Corrosion

Tank	Special Survey No. 1 Age < 5	Special Survey No. 2 5 < Age <10	Special Survey No. 3 10 < Age < 15	Special Survey No. 4 and Subsequent Age >15
Fuel Oil Bunkertanks				
-Engine Room	None	None	One	One
-Cargo Length Area	None	One	Two	Half, minimum 2
-If no tanks in Cargo Length Area, additional fuel tank(s) outside of Engine Room (if fitted)	None	One	One	Two
Lube Oil	None	None	None	One
Fresh Water	None	One	All	All

Notes
1. These requirements apply to tanks of integral (structural) type.
2. If a selection of tanks is accepted to be examined, then different tanks are to be examined at each special survey, on a rotational basis.
3. Peak tanks (all uses) are subject to internal examination at each special survey.
4. 4) At special surveys no 3 and subsequent surveys, one deep tank for fuel oil in the cargo length area is to be included, if fitted.

Table 3: Minimum requirements for internal examination at Hull Special Surveys of Fuel Oil, Lube Oil and Fresh Water Tanks

Special Survey No.1 **Age < 5**	**Special Survey No.2** **5 < age <10**	**Special Survey No.3 and subsequent** **Age >10**
- Two air pipe heads, one port and one starboard, located on the exposed decks in the forward 0.25 L, preferably air pipes serving ballast tanks.	- All air pipe heads located on the exposed decks in the forward 0.25L.	- All air pipe heads located on the exposed decks
- Two air pipe heads, one port and one starboard, on exposed decks, serving spaced aft of 0.25 L, preferably air pipes serving ballast tanks.	- At least 20% of air pipe heads on the exposed decks serving spaces aft of 0.25 L, preferably air pipes serving ballast tanks	
Notes 1. The selection of air pipe heads to be examined is left to the attending Surveyor. 2. According to the results of this examination, the Surveyor may require the examination of other heads located on the exposed decks.		Notes 1. Exemption may be considered for air pipe heads where there is substantial evidence of replacement after the last special survey.

Table 4: Survey Requirements for automatic pipe heads at Special Surveys

4.3 Requirements for the Cargo Ship Safety Equipment Certificate

4.3.1 For the life-saving appliances and the other equipment of cargo ships after the completion of the “Hull Class Renewal Survey”, the Cargo Ship Safety Equipment Certificate should be issued.

4.3.2 For the life-saving appliances and the other equipment of cargo ships the “Hull Class Renewal Survey” should consist of:

4.3.2.1 examining the fire pumps, fire main, hydrants, hoses and nozzles and the international shore connection and checking that each fire pump, including the emergency fire pump, can be operated separately so that two jets of water are produced simultaneously from different hydrants at any part of the ship whilst the required pressure is maintained in the fire main

4.3.2.2 checking the provision and randomly examining the condition of the portable and non-portable fire extinguishers

4.3.2.3 confirming that the firefighters' outfits including its self-contained compressed air breathing apparatus and emergency escape breathing devices (EEBDs) are complete and in good condition, that the cylinders, including the spare cylinders, of any required self-contained breathing apparatus are suitably charged, and that on board means of recharging breathing apparatus cylinders used during drills or a suitable number of spare cylinders to replace those used are provided, and provision of two-way portable radiotelephone apparatus of an explosion-proof type or intrinsically safe

4.3.2.4 checking the operational readiness and maintenance of firefighting systems

4.3.2.5 examining the fixed firefighting system for the machinery, cargo, vehicle, special category and ro-ro spaces, as appropriate, and confirming that its means of operation is clearly marked

4.3.2.6 examining the fire-extinguishing and special arrangements in the machinery spaces and confirming, as far as practicable and as appropriate, the operation of the remote means of control provided for the opening and closing of the skylights, the release of smoke, the closure of the funnel and ventilation openings, the closure of power operated and other doors, the stopping of ventilation and boiler forced and induced draft fans and the stopping of oil fuel and other pumps that discharge flammable liquids

4.3.2.7 checking that fixed carbon dioxide fire-extinguishing systems for the protection of machinery spaces and cargo pump-rooms, where applicable, are provided with two separate controls, one for opening of the gas piping and one for discharging the gas from the storage container, each of them located in a release box clearly identified for the particular space

4.3.2.8 examining, as far as possible, and testing, as feasible, any fire detection and alarm system and any sample extraction smoke detection system

4.3.2.9 examining the fire-extinguishing systems for spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces

4.3.2.10 examining the helicopter facilities

4.3.2.11 examining the arrangements for remote closing of valves for oil fuel, lubricating oil and other flammable oils and confirming, as far as practicable and as appropriate, the operation of the remote means of closing the valves on the tanks that contain oil fuel, lubricating oil and other flammable oils

4.3.2.12 examining and testing of the general emergency alarm system

4.3.2.13 examining the fire protection arrangements in cargo, vehicle and ro-ro spaces and confirming, as far as practicable and as appropriate, the operation of the means of control provided for closing the various openings

4.3.2.14 examining, where applicable, the alternative design and arrangements for fire safety or life-saving appliances and arrangements, in accordance with the test, inspection and maintenance requirements, if any, specified in the approved documentation

4.3.2.15 examining, when appropriate, the special arrangements for carrying dangerous goods, including checking the electrical equipment and wiring, the ventilation, the provision of protective clothing and portable appliances and the testing of the water supply, bilge pumping and any water spray system

4.3.2.16 checking that the life-saving appliances are of international or vivid reddish orange, or a comparably highly visible colour on all parts where this will assist detection at sea

4.3.2.17 examining each survival craft, including its equipment and, when fitted, the on-load release mechanism and hydrostatic lock and, for inflatable liferafts, the hydrostatic release unit and float-free arrangements. Checking that the hand-held flares are not out of date

4.3.2.18 for liferafts provided for easy side to side transfer, verifying that they are less than 185 kg

4.3.2.19 checking that the falls used in launching appliances have been periodically inspected and have been renewed as necessary in the past five years

4.3.2.20 examining the embarkation arrangements and launching appliances for each survival craft. Each lifeboat should be lowered to the embarkation position or, if the stowage position is the embarkation position, lowered a short distance and, if practicable, one of the survival craft should be lowered to the water. The operation of the launching appliances for davit-launched liferafts should be demonstrated

4.3.2.21 checking that a thorough examination of launching appliances, including the dynamic testing of the winch brake, and servicing of lifeboat and rescue boat on-load release gear, including free-fall lifeboat release systems and davit-launched life raft automatic release hooks, has been carried out. The operational testing of free-fall lifeboat release systems shall be performed either by free-fall launch with only the operating crew on board or by a simulated launching carried out based on MSC.1/Circ.1206/Rev.1

4.3.2.22 examining each rescue boat, including its equipment. For inflatable rescue boats, confirming that they are stowed in a fully inflated condition

4.3.2.23 confirming that there are posters or signs in the vicinity of the survival craft, their launching stations and containers, brackets, racks and other similar stowage locations for life-saving equipment

4.3.2.24 examining the embarkation and recovery arrangements for each rescue boat. If practicable, the rescue boat(s) should be lowered to the water and its recovery demonstrated

4.3.2.25 testing that the engine of the rescue boat(s) and of each lifeboat, when so fitted, start satisfactorily and operate both ahead and astern;

4.3.2.26 examining and checking the operation of two-way VHF radiotelephone apparatus and search and rescue locating devices

4.3.2.27 examining the line-throwing appliance and checking that its rockets and the ship's distress signals are not out of date, and examining and checking the operation of on board communications equipment and the general emergency alarm system

4.3.2.28 examining the provision, disposition, stowage and the condition of the lifebuoys, including those fitted with self-igniting lights, self-activating smoke signals and buoyant lines, lifejacket* and their whistles and lights, immersion suits and anti-exposure suits and that their associated batteries are not out of date

4.3.2.29 checking that immersion suits designed to be worn in conjunction with a lifejacket are suitably marked (LSA Code section 2.3.1)

4.3.2.30 checking the lighting of the muster and embarkation stations and the alleyways, stairways and exits giving access to the muster and embarkation stations, including when supplied from the emergency source of power

4.3.2.31 checking that the required navigation lights, shapes and sound signalling equipment are in order

4.3.2.32 checking that the following items of navigation equipment are in working order, as appropriate: daylight signalling lamp, magnetic compass, transmitting heading device, gyro compass, gyro compass repeaters, radar installation(s), electronic plotting aid, automatic tracking aid(s) or automatic radar plotting aid(s), echo-sounding device, speed and distance measuring device(s), rudder angle indicator, propeller rate of revolution indicator, variable-pitch propeller pitch and operational mode indicator, rate-of-turn indicator, heading or track control system, Global Navigation Satellite System (GNSS) receiver, terrestrial radio navigation system and sound reception system, means of communication with emergency steering position, a pelorus or compass bearing device, means for correcting heading and bearings, BNWAS as applicable and ECDIS including back-up arrangements, as applicable. Items that cannot be checked with the ship in port should be verified from records

4.3.2.33 checking the provision, specification, operation and annual performance test of the voyage data recorder, where fitted

4.3.2.34 checking the provision and operation of the automatic identification system, where fitted, and whether the annual test has been carried out and a copy of the test report is on board

4.3.2.35 checking that a valid conformance test report of the long-range identification and tracking system is available on board, where fitted

4.3.2.36 checking the provision and specification of the pilot ladders and pilot transfer arrangements

4.3.2.37 checking that the means of embarkation and disembarkation from ships for use in port and in port-related operations, such as gangways and

4.3.2.38 checking, when appropriate, the provision of an appropriate instrument for measuring the concentration of gas or oxygen in the air together with detailed instructions for its use

4.3.2.39 confirming that ship-specific plans and procedures for recovery of persons from the water have been provided

4.3.2.40 confirming, during the examination of the fixed firefighting system for the machinery, cargo, vehicle, special category and ro-ro spaces, that, as appropriate, any foam compounds and the CO2 capacity have been checked and that the distribution pipework has been proved clear

4.3.2.41 testing the operation of the remote means of control provided for the opening and closing of the skylights, the release of smoke, the closure of the funnel and ventilation openings, the closure of power operated and other doors, the stopping of ventilation and boiler forced and induced draft fans and the stopping of oil fuel and other pumps that discharge flammable liquids

4.3.2.42 testing any fire detection and alarm system and any sample extraction smoke detection system

4.3.2.43 testing, as feasible, the fire-extinguishing system for spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces

4.3.2.44 testing the remote closing of valves for oil fuel, lubricating oil and other flammable oils and the operation of the remote means of closing the valves on the tanks that contain oil fuel, lubricating oil and other flammable oils

4.3.2.45 testing the operation of the means of control provided for closing the various openings for the cargo, vehicle, special category and ro-ro

4.4 Requirements for the Cargo Ship Safety Construction Certificate

4.4.1 After the satisfactory survey of the following items during “Hull Class Renewal Survey” for Cargo Ship Safety Construction, the Cargo Ship Safety Construction Certificate should be issued.

4.4.2 For the hull, machinery and equipment of cargo ships the examination of current certificates and other records should consist of:

4.4.2.1 examining, in general and as far as can be seen, the hull and its closing appliances;

4.4.2.2 examining the anchoring and mooring equipment as far as can be seen. For ships built after 01/01/2007, confirming that the towing and mooring equipment is properly marked with any restriction associated with its safe operation

4.4.2.3 examining, for bulk carriers of 150 m and above, where appropriate, the ship's structure in accordance with the Ship Construction File, taking into account identified areas that need special attention

4.4.2.4 examining the collision and the other watertight bulkheads as far as can be seen

4.4.2.5 examining and testing (locally and remotely) all the watertight doors in watertight bulkheads

4.4.2.6 examining the arrangements for closing openings in the shell plating below the freeboard deck

4.4.2.7 examining each bilge pump and confirming that the bilge pumping system for each watertight compartment is satisfactory

4.4.2.8 confirming that the drainage from enclosed cargo spaces situated on the freeboard deck is satisfactory
- examining visually the drainage facilities for blockage or other damage and confirming the provision of means to prevent blockage of drainage arrangements, for closed vehicle and ro-ro spaces and special category spaces where fixed pressure water-spraying systems are used

4.4.2.9 confirming that the machinery, boilers and other pressure vessels, associated piping systems and fittings are installed and protected so as to reduce to a minimum any danger to persons on board, due regard being given to moving parts, hot surfaces and other hazards

4.4.2.10 confirming that the normal operation of the propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative

4.4.2.11 confirming that means are provided so that the machinery can be brought into operation from the dead ship condition without external aid

4.4.2.12 carrying out a general examination of the machinery, the boilers, all steam, hydraulic, pneumatic and other systems and their associated fittings to see whether they are being properly maintained and with particular attention to the fire and explosion hazards

4.4.2.13 examining and testing the operation of main and auxiliary steering arrangements, including their associated equipment and control systems

4.4.2.14 confirming that the means of communication between the navigation bridge and steering gear compartment and the means of indicating the angular position of the rudder are operating satisfactorily

4.4.2.15 confirming that with ships having emergency steering positions there are means of relaying heading information and, when appropriate, of supplying visual compass readings to the emergency steering position

4.4.2.16 confirming that the various alarms required for hydraulic power-operated, electric and electro-hydraulic steering gears are operating satisfactorily and that the re-charging arrangements for hydraulic power-operated steering gears are being maintained

4.4.2.17 examining the means for the operation of the main and auxiliary machinery essential for the propulsion and the safety of the ship, including, when applicable, the means of remotely controlling the propulsion machinery from the navigating bridge (including the control, monitoring, reporting, alert and safety actions) and the arrangements to operate the main and other machinery from a machinery control room

4.4.2.18 confirming the operation of the ventilation for the machinery spaces

4.4.2.19 when appropriate, confirming that the measures to prevent noise in machinery spaces are effective or confirming that the ship was constructed to reduce on board noise and to protect personnel from noise in accordance with the Code on noise levels on board ships, adopted by resolution MSC.337(91), as amended

4.4.2.20 confirming that the engine room telegraph, the second means of communication between the navigation bridge and the machinery space and the means of communication with any other positions from which the engines are controlled are operating satisfactorily

4.4.2.21 confirming that the engineer's alarm is clearly audible in the engineers' accommodation

4.4.2.22 examining, as far as practicable, visually and in operation, the electrical installations, including the main source of power and the lighting systems

4.4.2.23 confirming, as far as practicable, the operation of the emergency source(s) of electrical power including their starting arrangements, the systems supplied and, when appropriate, their automatic operation

4.4.2.24 examining, in general, that the precautions provided against shock, fire and other hazards of electrical origin are being maintained

4.4.2.25 examining the arrangements for periodically unattended machinery spaces and, in particular, the random testing of alarm, automatic and shutdown functions;

4.4.2.26 examining, where applicable, the alternative design and arrangements for machinery or electrical installations, or fire safety, in accordance with the test, inspection and maintenance requirements, if any, specified in the approved documentation

4.4.2.27 confirming, as far as practicable, that no changes have been made in the structural fire protection, examining any manual and automatic fire doors and proving their operation, testing the means of closing the main inlets and outlets of all ventilation systems and testing the means of stopping power ventilation systems from outside the space served

4.4.2.28 confirming that the means of escape from accommodation, machinery and other spaces are satisfactory

4.4.2.29 examining the arrangements for gaseous fuel for domestic purposes

4.4.2.30 examining visually the condition of any expansion joints in seawater systems;

4.4.2.31 confirming, when appropriate and as far as is practicable when examining internal spaces on oil tankers and bulk carriers, that the means of access to cargo and other spaces remain in good condition.

4.4.2.32 confirming that no new materials containing asbestos were installed on board*

4.4.2.33 examining the functionality of bilge well alarms to all cargo holds and conveyor tunnels

4.4.2.34 confirming that ship's identification number is permanently marked

4.4.2.35 confirming, where applicable, that an appropriate portable atmosphere testing instrument or instruments* is on board, and that suitable means are provided for the calibration of all such instruments; and checking appropriateness of the testing and calibration

4.4.2.36 for single hull, single hold cargo ships, examining the cargo hold water level detector and its audible and visual alarm

4.4.2.37 confirming that the coating system in dedicated SWB tanks in ships and double side skin spaces arranged in bulk carriers of 150 m in length and upward when appropriate is maintained and that maintenance, repair and partial recoating are recorded in the coating technical file

4.4.2.38 confirming, for bulk carriers constructed before 1 July 1999 with restrictions imposed with respect to the carriage of cargoes with a density of 1,780 kg/m3 and above, that a triangle is permanently marked at midship

4.4.2.39 confirming, for bulk carriers, that the loading instrument is on board and functioning

4.4.2.40 for ships over 5 years of age, an internal examination of representative spaces used for water ballast;

4.4.2.41 for ships over 10 years of age, other than gas carriers and ships engaged in the carriage of dry cargoes only, an internal examination of selected cargo spaces.

4.4.2.42 examination of sea valves and their connections to the hull;

4.4.2.43 examination of anchoring and mooring equipment for which purpose the anchors should be lowered and raised using the windlass.

4.5 Requirements for Surveys for the Cargo Ship Safety Radio Certificate

4.5.1 For the radio installations, including those used in radio life-saving appliances, on cargo ships after the completion of the "Hull Class Renewal Survey", the Cargo Ship Safety Radio Certificate should be issued.

4.5.2 For the radio installations, including those used in radio life-saving appliances, of cargo ships the "Hull Class Renewal Survey" should consist of:

4.5.2.1 examining the position, physical and electromagnetic protection and illumination of each radio installation

4.5.2.2 confirming the provision of equipment for the radio installation with due regard to the declared sea areas in which the ship will trade and the declared means of maintaining availability of functional requirements

4.5.2.3 confirming the ability to initiate the transmission of ship-to-shore distress alerts by at least two separate and independent means, each using a different radio communication service, from the position from which the ship is normally navigated

4.5.2.4 examining all antennas, including:
- visually checking all antennas, including Inmarsat antennas, and feeders for satisfactory siting and absence of defects
- checking insulation and safety of all antennas;

4.5.2.5 examining the reserve source of energy, including:
- checking there is sufficient capacity to operate the basic or duplicated equipment for 1 hour or 6 hours, as appropriate
- if the reserve source of energy is a battery:
  - checking its siting and installation
  - where appropriate, checking its condition by specific gravity measurement or voltage measurement;
  - with the battery off charge, and the maximum required radio installation load connected to the reserve source of energy, checking the battery voltage and discharge current;
  - checking that the charger(s) are capable of recharging the reserve battery within 10 hours
  - checking that information of ship's position is provided continuously and automatically to all two-way communication equipment

4.5.2.6 examining the VHF transceiver(s), including:
- checking for operation on channels 6, 13 and 16
- checking frequency tolerance, transmission line quality and radio frequency power output
- checking for correct operation of all controls including priority of control units
- checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy
- checking the operation of the VHF control unit(s) or portable VHF equipment provided for navigational safety
- checking for correct operation by on-air contact with a coast station or other ship;

4.5.2.7 examining the VHF DSC controller and channel 70 Digital Selective Calling (DSC) watch receiver, including:
- performing an off-air check confirming the correct Maritime Mobile Service Identity is programmed in the equipment
- checking for correct transmission by means of a routine or test call to a coast station, other ship, on board duplicate equipment or special test equipment;
- checking for correct reception by means of a routine or test call from a coast station, other ship, on board duplicate equipment or special test equipment;
- checking the audibility of the VHF/DSC alarm;
- checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy

4.5.2.8 examining the MF/HF radiotelephone equipment, including:
- checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy
- checking the antenna tuning in all appropriate bands;
- checking that the equipment is within frequency tolerance on all appropriate bands
- checking for correct operation by contact with a coast station and/or measuring transmission line quality and radio frequency output;
- checking receiver performance by monitoring known stations on all appropriate bands;
- if control units are provided outside the navigating bridge, checking that the control unit on the bridge has first priority for the purpose of initiating distress alerts

4.5.2.9 examining the HF radiotelex equipment, including:
- (if provided) and reserve sources of energy
- confirming that the correct selective calling number is programmed in the equipment;
- checking correct operation by inspection of recent hard copy or by a test with a coast radio station

4.5.2.10 examining the MF/HF DSC controller(s), including:
- checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy
- confirming that the correct Maritime Mobile Service Identity is programmed in the equipment;
- checking the off-air self-test program;
- checking operation by means of a test call on MF and/or HF to a coast radio station if the rules of the berth permit the use of MF/HF transmissions
- checking the audibility of the MF/HF DSC alarm;

4.5.2.11 examining the MF/HF DSC watch receiver(s), including:
- confirming that only distress and safety DSC frequencies are being monitored
- checking that a continuous watch is being maintained whilst keying MF/HF radio transmitters
- checking for correct operation by means of a test call from a coast station or other ship;

4.5.2.12 examining the Inmarsat Ship Earth Station(s), including:
- checking that the equipment operates from the main, emergency (if provided) and reserve sources of energy, and that where an uninterrupted supply of information from the ship's navigational or other equipment is required ensuring such information remains available in the event of failure of the ship's main or emergency source of electrical power.
- checking the distress function by means of an approved test procedure where possible
- checking for correct operation by inspection of recent hard copy or by test call;

4.5.2.13 if appropriate, examining the NAVTEX equipment, including:
- checking for correct operation by monitoring incoming messages or inspecting recent hard copy;
- running the self-test program if provided;

4.5.2.14 examining the Enhanced Group Call equipment, including:
- checking for correct operation and area by monitoring incoming messages or by inspecting recent hard copy;
- running the self-test program if provided;

4.5.2.15 if appropriate, examining the radio equipment for receipt of maritime safety information by HF Narrow Band Direct Printing (NBDP), including:
- checking for correct operation by monitoring incoming messages or inspecting recent hard copy;
- running the self-test program if provided;

4.5.2.16 examining the 406 MHz satellite Emergency Position Indicating Radio Beacon (EPIRB), including:
- checking position and mounting for float free operation;
- carrying out visual inspection for defects;
- carrying out the self-test routine;
- checking that the unique beacon identification code is clearly marked on the outside of the equipment and, where possible, decoding the unique beacon identification code confirming it is correct;
- checking that the unique beacon identification code programmed in the EPIRB corresponds with the unique beacon identification code assigned by or on behalf of the Administration;
- checking that the MMSI number if encoded in the beacon corresponds with the MMSI number assigned to the ship;
- checking the battery expiry date;
- if provided, checking the hydrostatic release and its expiry date;
- checking the emission on operational frequencies, coding and registration on the 406 MHz signal without transmission of a distress call to the satellite;
- checking that the EPIRB has been subject to maintenance at intervals not exceeding five years at an approved shore-based maintenance facility
- if possible, checking the emission on operational frequencies, coding and registration on the 121.5 MHz homing signal without transmission of a distress call to the satellite;

4.5.2.17 examining the two-way VHF radiotelephone apparatus, including:
- checking for correct operation on Channel 16 and one other by testing with another fixed or portable VHF installation
- checking the battery charging arrangements where re-chargeable batteries are used;
- checking the expiry date of primary batteries where used;
- where appropriate, checking any fixed installation provided in a survival craft;

4.5.2.18 examining the search and rescue locating device(s), including:
- checking the position and mounting;
- monitoring response on ship's 9 GHz radar;
- checking the battery expiry date;

4.5.2.19 examining the test equipment and spares carried to ensure carriage is adequate in accordance with the sea areas in which the ship trades and the declared options for maintaining availability of the functional requirements.

4.6 Requirements for the for the International Load Line Certificate

4.6.1 For the load line the completion of the “Hull Class Renewal Survey” issuing the International Load Line Certificate or International Load Line Exemption Certificate.

4.6.2 For the load line the examination of current certificates and other records should consist of:

4.6.2.1 checking, in general, that there has been no deterioration in the strength of the hull

4.6.2.2 checking of the positions of the deck line and load line which, if necessary, are to be re-marked and re-painted

4.6.2.3 checking that no alterations have been made to the hull or superstructures that would affect the calculations determining the position of the load lines

4.6.2.4 examining the superstructure end bulkheads and the openings therein

4.6.2.5 examining the means of securing the weather tightness of cargo hatchways, other hatchways and other openings on the freeboard and superstructure decks

4.6.2.6 examining the ventilators and air pipes, including their coamings and closing appliances

4.6.2.7 examining the watertight integrity of the closures to any openings in the ship's side below the freeboard deck

4.6.2.8 examining the scuppers, inlets and discharges

4.6.2.9 examining the garbage chutes

4.6.2.10 examining the means provided to minimize water ingress through the spurling pipes and chain lockers

4.6.2.11 examining the side scuttles and deadlights

4.6.2.12 examining the bulwarks including the provision of freeing ports, special attention being given to any freeing ports fitted with shutters

4.6.2.13 examining the guardrails, gangways, walkways and other means provided for the protection of the crew and means for safe passage of crew

4.6.2.14 examining the special requirements for ships permitted to sail with type "A" or type "B-minus" freeboards

4.6.2.15 checking, when applicable, the fittings and appliances for timber deck cargoes

4.6.2.16 examining the hull to ensure that its strength is sufficient for the draft corresponding to the freeboard assigned

4.7 Requirements for Surveys for the International Oil Pollution Prevention Certificate

4.7.1 For oil pollution prevention the completion of the “Hull Class Renewal Survey” issuing the International Oil Pollution Prevention Certificate.

4.7.2 For oil pollution prevention the examination of current certificates and other records should consist of:

4.7.2.1 verifying that, if applicable, the 15 ppm bilge alarm has been calibrated by the manufacturer or a person authorized by the manufacturer and that a valid calibration certificate is available on board.

4.7.3 For oil pollution prevention the examination of current certificates and other records for tankers should additionally consist of:

4.7.3.1 verifying that, if applicable, the oil discharge monitoring equipment has been calibrated and that a valid calibration certificate is available on board.

4.7.4 For oil pollution prevention the “Hull Class Renewal Survey” should consist of:

4.7.4.1 examining externally the oil filtering equipment and confirming, as far as practicable, its satisfactory operation including, when appropriate, testing the operation of the automatic means provided to stop the discharge of effluent and the alarm for the oil filtering equipment.

4.7.4.2 testing, where fitted, the oil filtering equipment required for discharge in special areas.

4.7.4.3 confirming the segregation of oil fuel and water ballast systems and that the arrangements prohibit the carriage of oil in forepeak tanks or in spaces forward of the collision bulkhead.

4.7.4.4 checking that the arrangement of oil residue (sludge) tank and its discharge arrangements are satisfactory and confirming that, where applicable, homogenizers, sludge incinerators or other recognized means for the control of sludge are satisfactory.

4.7.4.5 confirming that a standard discharge connection is provided.

4.7.4.6 examining the oily-water separating equipment or oil filtering equipment or process unit, where fitted, including associated pumps, piping and fittings for wear and corrosion.

4.7.4.7 examining the oil content meter (15 ppm alarm and bilge monitor) for obvious defects, deterioration or damage and checking the record of calibration of the meter when done in accordance with the manufacturer's operational and instruction manual.

4.7.4.8 confirming, if necessary by simulated test or equivalent, the satisfactory operation of the oily-water separating equipment or oil filtering equipment.

4.7.4.9 confirming, if necessary by simulated test or equivalent, the satisfactory operation of the oil discharge monitoring and control system, including where practicable the automatic and manual operation of the means provided to stop the discharge of effluent.

4.7.4.10 confirming the satisfactory operation of the alarm for the oil filtering system.

4.7.4.11 confirming the satisfactory operation of homogenizers, sludge incinerators or other recognized means for the control of sludge when the size of oil residue (sludge) tank is approved on the basis of such installations.

4.8 Requirements for Surveys for the International Sewage Pollution Prevention Certificate

4.8.1 For sewage pollution prevention the successful completion of the “Hull Class Renewal Survey” issuing the International Sewage Prevention Certificate.

4.8.2 For sewage pollution prevention the examination of current certificates and other records should consist of:

4.8.3 For sewage pollution prevention the renewal survey should consist of:

4.8.3.1 confirming that no change has been made nor any new equipment installed which would affect the validity of the certificate.

4.8.3.2 examining externally the sewage pollution prevention system and confirming, as far as practicable its satisfactory operation.

4.8.3.3 confirming that a procedure for discharge of animal effluent is implemented on board.

4.8.3.4 confirming, for ships where a sewage holding tank is fitted as a sewage system, that an approval for the rate of discharge is available.

4.9 Requirements for the International Air Pollution Prevention Certificate and the Nox Technical Code

4.9.1 For air pollution prevention the successful completion of the “Hull Class Renewal Survey” issuing the International Air Pollution Prevention Certificate.

4.9.2 For air pollution prevention the renewal survey should consist of:

4.9.2.1 confirm that no changes have been made or any new equipment installed which would affect the validity of the certificate;

4.9.2.2 Systems containing ozone-depleting substances, if fitted:

- confirm that no new installation or equipment containing ozone depleting substances except those containing hydro-chlorofluocarbons have been fitted to the ship after 19 May 2005.
- examine externally any installation or equipment as far as practicable to ensure satisfactory maintenance and that there are no emissions of ozone-depleting substances;
- confirm through documentary evidence that there has been no deliberate emission of ozone-depleting substance;

4.9.2.3 Nitrogen oxide emissions from each diesel marine diesel engine:

- confirm that each marine diesel engine has been operated as required in accordance with its applicable NOx emission limit(s);
- confirm that no marine diesel engine been subject to major conversion in the intervening period;
- if engine parameter check method is used:
  - review engine documentation contained in the Technical File and the record book of engine parameters to check, as far as practicable, engine rating, duty and limitation/restrictions as given in the Technical File;
  - confirm that the engine has not undergone any modifications or adjustments outside the options and ranges permitted in the Technical File since the last survey;
  - conduct survey as detailed in the Technical File;
- if the simplified method is used:
  - review engine documentation contained in the Technical File;
  - confirm that the test procedure is acceptable to the Administration;
  - confirm that the analysers, engine performance sensors, ambient condition measurement equipment, span check gases and other test equipment are the correct type and have been calibrated in accordance with the NOx Technical Code;
  - confirm that the correct test cycle, as defined in the engine's Technical File, is used for this onboard confirmation test measurements;
  - ensure that a fuel sample is taken during the test and submitted for analysis;
  - witness the test and confirm that a copy of the test report has been submitted for approval on completion of the test;
- if the direct measurement and monitoring method is used:
  - review the Technical File and the onboard monitoring manual that the arrangements are as approved;
  - the procedures to be checked in the direct monitoring and measure method and the data obtained as given in the approved onboard monitoring manual should be followed
- for a marine diesel engine with an output of more than 5,000 kW and a per cylinder displacement at or above 90 litres/cylinder installed on ships constructed between 1 January 1990 and 31 December 1999, check whether:
  - an approved method exists;
  - an approved method is not commercially available; or
  - that an approved method is installed and where this is the case, that there is an approved method file, and apply the verification procedures as given in the approved method file;
  - or that the engine has been certified, confirming that it operates within the limits set forth for Tier I, Tier II or Tier III.

4.9.2.4 Sulphur Oxides and Particulate Matter:

- confirming, if appropriate, that:
  - satisfactory arrangements are in place for using compliant fuel as required; or
  - satisfactory installation and operation of the fuel switching arrangements are in place when tanks are provided for different grades of fuel, including records of the changeover to and from low sulphur fuel during transit through an emission control area established for SOx and particulate matter control;
  - or satisfactory installation and operation of the exhaust gas cleaning system or other technological methods are examined.

4.9.2.5 Volatile Organic Compounds (VOCs):

- confirm that the vapour collect system, if required, is maintained in accordance with its approved arrangement;
- for ships carrying crude oil, confirm the VOC management plan has been implemented as appropriate;

4.9.2.6 Incineration:

- confirm that prohibited materials have not been incinerated;
- confirm that shipboard incineration of sewage sludge or sludge oil in boilers or marine power plants is not undertaken while the ship is inside ports, harbours or estuaries;

4.9.2.7 Incinerators (installed on or after 1 January 2000):

- confirm that operators have been trained as required;
- confirm from an external examination that each incinerator is in a generally satisfactory condition and free from leaks of gas or smoke;
- confirm that combustion chamber outlet temperatures have been maintained as required;
- confirm that each incinerator is maintained according to its approved arrangement.

4.9.2.8 for each incinerator the “Hull Class Renewal Survey” should consist of;

- confirming, if necessary by simulated test or equivalent, the satisfactory operation of the alarms and safety devices.

Section 5 – Surveys for Bulk Carriers

5.1 General requirements

5.1.1 The requirements apply to all self-propelled Bulk Carriers other than Double Skin Bulk Carriers.

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

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

5.1.4 Ships which are required to comply with IACS UR S19 are subject to the additional thickness measurement guidance contained in Part 8/Ch 2/Sec 13 with respect to the vertically corrugated transverse watertight bulkhead between cargo holds Nos. 1 and 2 for purposes of determining compliance with IACS UR S19 prior to the relevant compliance deadline stipulated in IACS UR S23 and at subsequent intermediate surveys (for ships over 10 years of age) and special surveys for purposes of verifying continuing compliance with IACS UR S19.

5.1.5 Ships which are required to comply with IACS UR S31 are subject to the additional thickness measurement guidance contained in Part 8/Ch 2/Sec 13 with respect to the side shell frames and brackets for the purposes of determining compliance with IACS UR S31 prior to the relevant compliance deadline stipulated in IACS UR S31 and at subsequent intermediate and special surveys for purposes of verifying continuing compliance with IACS UR S31.

5.1.6 For bulk carriers with hybrid cargo hold arrangements, e.g. with some cargo holds of single side skin and others of double side skin, the requirements of IACS UR Z10.5 are to apply to cargo holds of double side skin and associated wing spaces.

5.2 Thickness measurements and close-up surveys

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

5.3 Extent of Overall and Close-up Survey

5.3.1 An Overall Survey of all tanks and spaces is to be carried out at each Special Survey. Fuel oil tanks in the cargo length area are to be surveyed as follows:

Special Survey No. 1 $Age \leq 5$	Special Survey No. 2 $5 < Age \leq 10$	Special Survey No. 3 $10 < Age \leq 15$	Special Survey No. 4 and Subsequent $Age > 15$
None	One	Two	Half, minimum two
Notes 1. These requirements apply to tanks of integral (structural) type. 2. If a selection of tanks is accepted to be examined, then different tanks are to be examined at each special survey, on a rotational basis. 3. Peak tanks (all uses) are subject to internal examination at each special survey. 4. At special survey No.3 and subsequent special surveys, one deep tank for fuel oil in the cargo area is to be included, if fitted.			

5.3.2 The minimum requirements for close-up surveys at special survey are given in Table I.

5.3.3 The Surveyor may extend the close-up survey as deemed necessary taking into account the maintenance of the spaces under survey, the condition of the corrosion prevention system and where spaces have structural arrangements or details which have suffered defects in similar spaces or on similar ships according to available information.

5.3.4 For areas in spaces where hard protective coatings are found to be in a GOOD condition, the extent of close-up surveys according to Table I may be specially considered.

5.4 Renewal Survey-Additional items for hull

5.4.1 The herein requirements are provided in addition to those mentioned in Section 4.

5.4.2 An Overall Survey of all tanks and spaces is to be carried out at each Special Survey.

5.4.3 The minimum requirements for thickness measurement at Special Survey are given in Table II.

For additional thickness measurement guidelines applicable to the vertically corrugated transverse watertight bulkhead between cargo hold Nos. 1 and 2 on ships subject to compliance with IACS URs S19 and IACS S23, reference is to be made to Part 8/Ch 2/Sec 13/ Par 13.3.2. For additional thickness measurement guidelines applicable to the side shell frames and brackets on ships subject to compliance with IACS UR S31, reference is to be made Part 8/Ch 2/Sec 13 .

5.4.4 Provisions for extended measurements for areas with Substantial Corrosion are given in Table III(1-5) and as may be additionally specified in the Survey Programme as required by 5.1. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

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

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

5.4.5.2 required to be measured at annual intervals.

5.4.6 The Surveyor may further extend the thickness measurements as deemed necessary.

5.4.7 For areas in tanks where hard protective coatings are found to be in a GOOD condition, the extent of thickness measurement according to Table II may be specially considered.

5.4.8 Transverse sections are to be chosen where largest reductions are suspected to occur or are revealed from deck plating measurements, one of which is to be in the amidships area.

5.4.9 Representative thickness measurement to determine both general and local levels of corrosion in the shell frames and their end attachments in all cargo holds and water ballast tanks is to be carried out. Thickness measurement is also to be carried out to determine the corrosion levels on the transverse bulkhead plating. The extent of thickness measurements may be specially considered provided the Surveyor is satisfied by the close-up survey, that there is no structural diminution, and the hard protective coating where applied remains efficient.

5.4.10 Extent of Tank Testing.
All boundaries of water ballast tanks, deep tanks and cargo holds used for water ballast within the cargo length area are to be pressure tested. For Fuel Oil Tanks, only representative tanks are to be pressure tested.

5.4.11 The Surveyor may extend the tank testing as deemed necessary

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

5.4.13 Boundaries of ballast holds are to be tested with a head of liquid to near to the top of hatches.

5.4.14 Boundaries of fuel oil tanks are to be tested with a head of liquid to the highest point that liquid will rise under service conditions. Tank testing of fuel oil tanks may be specially considered based on a satisfactory external examination of the tank boundaries, and a confirmation from the Master stating that the pressure testing has been carried out according to the requirements with satisfactory results.

5.4.15 The testing of double bottom tanks and other spaces not designed for the carriage of liquid may be omitted, provided a satisfactory internal examination together with an examination of the tanktop is carried out.

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

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

5.4.16.2 For ships complying with the requirements of SOLAS XII/13 for the availability of pumping systems, the special survey is to include an examination and a test of the means for draining and pumping ballast tanks forward of the collision bulkhead and bilges of dry spaces any part of which extends forward of the foremost cargo hold, and of their controls.

Special Survey No. 1 $Age \leq 5$	**Special Survey No. 2** $5 < Age \leq 10$	**Special Survey No. 3** $10 < Age \leq 15$	**Special Survey No. 4 and Subsequent** $Age > 15$
A. - 25% of shell frames in the forward cargo hold at representative positions.	A. - All shell frames in the forward cargo hold and 25% of shell frames in each of the remaining cargo holds, including upper and lower end attachments and adjacent shell plating. For Bulk Carriers 100,000 DWT and above, all shell frames in the forward cargo hold and 50% of shell frames in each of the remaining cargo holds, including upper and lower end attachments and adjacent shell plating.	A. - All shell frames in the forward and one other selected cargo hold and 50% of frames in each of the remaining cargo holds, including upper and lower end attachments and adjacent shell plating.	A. - All shell frames in all cargo holds including upper and lower end attachments and adjacent shell plating. Areas (B) - (E) as for Special Survey No. 3
A. - Selected frames in remaining cargo holds.	B. - One transverse web with associated plating and longitudinals in each water ballast tank.	B. - All transverse webs with associated plating and longitudinals in each water ballast tank.	
B. - One transverse web with associated plating and longitudinals in two representative water ballast tanks of each type (i.e. topside, or hopper side tank).	B. - Forward and aft transverse bulkhead in one ballast tank, including stiffening system.	B. - All transverse bulkheads in ballast tanks, including stiffening system. Areas (C), (D) and (E) as for Special Survey No. 2	
C. - Two selected cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted.	C. - All cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted.		
D. - All cargo hold hatch covers and coamings (plating and stiffeners).	D. - All cargo hold hatch covers and coamings (plating and stiffeners). Transverse bulkhead complete – including girder system and adjacent structural members		
	E. - All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches.		
(A) - Cargo hold transverse frames (B) - Transverse web frame or watertight transverse bulkhead in water ballast tanks (C) - Cargo hold transverse bulkheads plating, stiffeners and girders (D) - Cargo hold hatch covers and coamings. Subject to cargo hold hatch covers of approved design which structurally have no			

access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures. (E) - Deck plating and under deck structure inside line of hatch openings between cargo hold hatches See sketches of sheet 14 for the areas corresponding to (A), (B), (C), (D) and (E) See also sketch in Annex V for zones of side shell frames for ships subject to compliance with UR S31 Note: Close-up Survey of transverse bulkheads to be carried out at four levels: Level (a) Immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without lower stool. Level (b) Immediately above and below the lower stool shelf plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates. Level (c) About mid-height of the bulkhead. Level (d) Immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools, or immediately below the topside tanks.

Table I: Minimum Requirements for close-up survey at Special hull surveys of Bulk Carriers

Special Survey No. 1 $Age \leq 5$	**Special Survey No. 2** $5 < Age \leq 10$	**Special Survey No. 3** $10 < Age \leq 15$	**Special Survey No. 4 and Subsequent** $Age > 15$
Suspect areas	Suspect areas	Suspect areas	Suspect areas
	Within the cargo length: Two transverse sections of deck plating outside line of cargo hatch openings	Within the cargo length: • each deck plate outside line of cargo hatch openings • two transverse sections, one in the amidship area, outside line of cargo hatch openings • all wind and water strakes	Within the cargo length: • each deck plate outside line of cargo hatch openings • three transverse sections, one in the amidship area, outside line of cargo hatch openings • each bottom plate
	Wind and water strakes in way of the two transverse sections considered above Selected wind and water strakes outside the cargo length area	Selected wind and water strakes outside the cargo length area	All wind and water strakes, full length
	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.
		See Part 8/Sec 13 for additional thickness measurement guidelines applicable to the vertically corrugated transverse watertight bulkhead between cargo hold Nos. 1 and 2 on ships subject to compliance with URs S19 and S23.	See Part 8/Sec 13 for additional thickness measurement guidelines applicable to the vertically corrugated transverse watertight bulkhead between cargo hold Nos. 1 and 2 on ships subject to compliance with URs S19 and S23.
	See 1.1.5 and Annex V for additional thickness Measurement guidelines applicable to the side shell frames and brackets on	See Part 8/Sec 13 for additional thickness measurement guidelines applicable to the side shell	See Part 8/Sec 13for additional thickness measurement guidelines applicable to the side shell frames and brackets on

	ships subject to compliance with UR S31.	frames and brackets on ships subject to compliance with UR S31.	ships subject to compliance with UR S31.

Table II: Minimum requirements for thickness measurements at special hull survey of bulk carriers

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
1. Bottom and Side Shell plating	a. Suspect plate, plus four adjacent plates b. See other tables for particulars on gauging in way of tanks and cargo holds	5-point pattern for each panel between longitudinals and webs
2. Bottom/Side Shell longitudinals	Minimum of three longitudinals in way of suspect areas	3 measurements in line across web 3 measurements on flange

Table III/1: Requirements for extent of thickness measurement at those areas of substantial corrosion special survey of bulk carriers within the cargo area - SHELL STRUCTURE

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
1. Lower Stool	a. Transverse band within 25mm of welded connection to inner bottom b.Transverse band within 25 mm of welded connection to shelf plate	a. 5 point between stiffeners over 1 metre length b. Ditto
3. Transverse Bulkhead	a. Transverse band at approximately mid height b.Transverse band at part of bulkhead adjacent to upper deck or below upper stool shelf plate (for those ships fitted with upper stools)	a. 5 point pattern over 1 sq. metre of plating a. 5 point pattern over 1 sq. metre of plating

Table III/2: Requirements for extent of Thickness Measurement at those areas of substantial Corrosion Special Survey of Bulk Carriers Within the Cargo Area - TRANSVERSE BULKHEADS IN CARGO HOLDS

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
1. Cross Deck Strip plating	Suspect cross deck strip plating	a. 5 point pattern between underdeck stiffeners over 1 metre length
2. Underdeck Stiffeners	a. Transverse members b. Longitudinal member	a. 5 point pattern at each end and mid span b. 5 point pattern on both web and flange
3. Hatch Covers	a. Side and end skirts, each 3 locations b. 3 longitudinal bands outboard strakes (2) and centreline strake (1)	a. 5 point pattern at each location b. 5 point measurement each band
4. Hatch Coamings	Each side and end coaming, one band lower 1/3, one band upper 2/3 of coaming	5 point measurement each band i.e. end of side coaming
5. Topside Water Ballast Tanks	Watertight transverse bulkheads	

	i. lower 1/3 of bulkhead ii. upper 2/3 of bulkhead iii. stiffeners b. 2 representative swash transverse bulkheads i. lower 1/3 of bulkhead ii. upper 2/3 of bulkhead iii. stiffeners c. 3 representative bays of slope plating i. lower 1/3 of tank ii. upper 2/3 of tank d. Longitudinals, suspect and adjacent	i. 5 point pattern over 1 sq. metre of plating ii. 5 point pattern over 1 sq. metre of plating iii 5 point pattern over 1 metre length i. 5 point pattern over 1 sq. metre of plating ii. 5 point pattern over 1 sq. metre of plating iii. 5 point pattern over 1 metre length i. 5 point pattern over 1 sq. metre of plating ii. 5 point pattern over 1 sq. metre of plating d. 5 point pattern both web and flange over 1 metre length
6. Main Deck Plating	Suspect plates and adjacent (4)	5 point pattern over 1 sq. metre of plating
7. Main Deck Longitudinals	Minimum of 3 longitudinals where plating measured	5 point pattern on both web and flange over 1 metre length
8. Web frames/Transverses	Suspect plates	5 point pattern over 1 sq. metre

Table III/3: Requirements for Extent of Thickness Measurement at Those Areas of Substantial Corrosion Special Survey of Bulk Carriers Within the Cargo Area. - DECK STRUCTURE INCLUDING CROSS STRIPS, MAIN CARGO HATCHWAYS, HATCH COVERS, COAMINGS AND TOPSIDE TANKS

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
1. Inner/Double Bottom Plating	Suspect plate plus all adjacent plates	5 point pattern for each panel between longitudinals over 1 metre length
2. Inner/Double Bottom Longitudinals	Three longitudinals where plates measured	+3 measurements in line across web and 3 measurements on flange
3. Longitudinal Girders or Transverse floors	b. Suspect plates	b.5 point pattern over about 1 sq. metre
4. Watertight Bulkheads (WT Floors)	a.lower 1/3 of tank b. upper 2/3 of tank	a.5 point pattern over 1 sq. metre of plating b.5 point pattern alternate plates over 1 sq. metre of plating
5. Web Frames	Suspect plate	5 point pattern over 1 sq. metre of plating
6. Bottom/side shell longitudinals	Minimum of three longitudinals in way of suspect areas	3 measurements in line across web 3 measurements on flange

Table III/4: Requirements for extent of thickness measurement at those areas of substantial corrosion special survey of bulk carriers within the cargo area. - DOUBLE BOTTOM AND HOPPER STRUCTURE

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
1. Side Shell frames	Suspect frame and each adjacent	a. At each end and mid span: 5 point pattern of both web and Flange b. 5 point pattern within 25 mm of welded attachment to both shell and lower slope plate

Table III/5: Requirements for extent of thickness measurement at those areas of substantial corrosion special survey of bulk carriers within the cargo area - CARGO HOLDS

5.5 Renewal Survey-Additional items for machinery

5.5.1 For the hull, machinery and equipment of cargo ships the examination of current certificates and other records should consist of:

5.5.1.1 for bulk carriers, examining the hold, ballast and dry space water level detectors and their audible and visual alarms.

5.5.1.2 for bulk carriers, checking the arrangements for availability of draining and pumping systems forward of the collision bulkhead

5.5.2 For the hull, machinery and equipment of cargo ships, concerning the additional requirements for bulk carriers the renewal survey should consist of the following:

5.5.2.1 for bulk carriers, examining and testing the hold, ballast and dry space water level detectors and their audible and visual alarms

5.5.2.2 confirming, for bulk carriers, that the loading instrument is on board and functioning

5.6 Annual Survey-Additional items for hull

5.6.1 Annual Surveys are to be held within 3 months before or after anniversary date from the date of the initial classification survey or of the date credited for the last Special Survey.

5.6.2 The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull and piping are maintained in a satisfactory condition.

5.6.3 Examination of the Hull

5.6.3.1 Examination of the hull plating and its closing appliances as far as can be seen.

5.6.3.2 Examination of watertight penetrations as far as practicable.

5.6.4 Examination of weather decks, Hatch covers and coamings

5.6.4.1 Confirmation is to be obtained that no unapproved changes have been made to the hatch covers, hatch coamings and their securing and sealing devices since the last survey.

5.6.4.2 A thorough survey of cargo hatch covers and coamings is only possible by examination in the open as well as closed positions and should include verification of proper opening and closing operation. As a result, the hatch cover sets within the forward 25% of the ship's length and at least one additional set, such that all sets on the ship are assessed at least once in every 5-year period, are to be surveyed open, closed and in operation to the full extent on each direction at each annual survey, including:

- stowage and securing in open condition;
- proper fit and efficiency of sealing in closed condition; and
- operational testing of hydraulic and power components, wires, chains, and link drives.

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

5.6.4.3 If there are indications of difficulty in operating and securing hatch covers, additional sets above those required by 3.2.3.2, at the discretion of the surveyor, are to be tested in operation.

5.6.4.4 Where the cargo hatch securing system does not function properly, repairs are to be carried out under the supervision of the DBS Society.

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

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

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

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

5.6.4.9 Examination of flame screens on vents to all bunker tanks.

5.6.4.10 Examination of bunker and vent piping systems, including ventilators.

5.6.5 **Examination of Cargo Holds**

5.6.5.1 **Bulk Carriers 10-15 years of age**, the following is to apply:
- Overall Survey of all cargo holds.
- Close-up survey of sufficient extent, minimum 25% of frames, to establish the condition of the lower region of the shell frames including approx. lower one third length of side frame at side shell and side frame end attachment and the adjacent shell plating in the forward cargo hold. Where this level of survey reveals the need for remedial measures, the survey is to be extended to include a Close-up Survey of all of the shell frames and adjacent shell plating of that cargo hold as well as a Close-up survey of sufficient extent of all remaining cargo holds.
- When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with Table VIII. These thickness measurements are to be carried out before the annual survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

For vessels built under the IACS Common Structural Rules, the annual thickness gauging may be omitted where a protective coating has been applied in accordance with the coating manufacturer's requirements and is maintained in good condition.
- Where the protective coating in cargo holds, as defined by Z9 is found to be in GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered.
- All piping and penetrations in cargo holds, including overboard piping, are to be examined.

5.6.5.2 **Bulk Carriers over 15 years of age**, the following is to apply:

- Overall Survey of all cargo holds.
- Close-up survey of sufficient extent, minimum 25% of frames, to establish the condition of the lower region of the shell frames including approx. lower one third length of side frame at side shell and side frame end attachment and the adjacent shell plating in the forward cargo hold and one other selected cargo hold. Where this level of survey reveals the need for remedial measures, the survey is to be extended to include a Close-up Survey of all of the shell frames and adjacent shell plating of that cargo hold as well as a Close-up Survey of sufficient extent of all remaining cargo holds.
- When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with Table VIII. These extended thickness measurements are to be carried out before the annual survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken. For vessels built under the IACS Common Structural Rules, the annual thickness gauging may be omitted where a protective coating has been applied in accordance with the coating manufacturer's requirements and is maintained in good condition.
- Where a hard protective coating is fitted in cargo holds, as defined by Z.9 and is found in GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered.
- All piping and penetrations in cargo holds, including overboard piping, are to be examined.

5.6.6 **Examination of Ballast Tanks**

5.6.6.1 Examination of Ballast Tanks when required as a consequence of the results of the Special Survey and Intermediate Survey is to be carried out. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with Table III/4. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous survey are to have thickness measurements taken.

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

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

5.6.7.1 Ships subject to SOLAS XII/9.1 are those meeting all the following conditions:

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

5.6.7.2 In accordance with SOLAS XII/9.1, for the foremost cargo hold of such ships, the additional survey requirements listed in Annex IV shall apply.

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

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

5.6.8.2 For ships complying with the requirements of SOLAS XII/13 for the availability of pumping systems, the annual survey is to include an examination and a test, of the means for draining and pumping ballast tanks forward of the collision bulkhead and bilges of dry spaces any part of which extends forward of the foremost cargo hold, and of their controls.

5.7 Intermediate survey- Additional items for hull

5.7.1 The Intermediate Survey is to be held at or between either the 2nd or 3rd Annual Survey.

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

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

5.7.4 The survey extent is dependent on the age of the vessel as follows:

5.7.5 **Bulk Carriers 5 -10 years of age**. The following is to apply:

5.7.5.1 **Ballast Tanks**

- For tanks used for water ballast, an overall survey of representative spaces
- selected by the Surveyor is to be carried out. The selection is to include fore and aft peak tanks and a number of other tanks, taking into account the total number and type of ballast tanks. If such overrall survey reveals no visible structural defects, the examination may be limited to verification that the corrosion prevention system remains efficient.
- Where POOR coating condition, corrosion or other defects are found in water Ballast tanks or where a hard Protective Coating was not applied from the time of construction, the examination is to be extended to other Ballast tanks of the same type.
- In ballast tanks other than double bottom tanks, where a hard Protective Coating is found in POOR condition, and it is not renewed, or where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from the time of construction, the tanks in question are to be examined and thickness measurements carried out as considered necessary at annual intervals. When such breakdown of hard protective coating is found in ballast double bottom tanks, or where a soft or semi-hard coating has been applied, or where a hard protective coating has not been applied, the tanks in question may be examined at annual intervals. When considered necessary by the Surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.
- In addition to the requirements above, suspect areas identified at previous surveys are to be overall and close-up surveyed.

5.7.5.2 **Cargo Holds**

- An overall survey of all cargo holds, including close-up survey of sufficient extent, minimum 25 % of frames, is to be carried out to establish the condition of:
  - Shell frames including their upper and lower end attachments, adjacent shell plating, and transverse bulkheads in the forward cargo hold and one other selected cargo hold;
  - Areas found suspect at previous surveys.
- Where considered necessary by the surveyor as a result of the overall and close-up survey as described in 4.2.2.2a, the survey is to be extended to include a close-up survey of all of the shell frames and adjacent shell plating of that cargo hold as well as a close-up survey of sufficient extent of all remaining cargo holds.

5.7.5.3 **Extent of Thickness Measurements**

- Thickness measurements are to be carried out to an extent sufficient to determine both general and local corrosion levels at areas subject to close-up survey as described in 4.2.2.2a. The minimum requirement for thickness measurements at the Intermediate Survey are areas found to be Suspect Areas at previous surveys.
- The extent of thickness measurement may be specially considered provided the Surveyor is satisfied by the close-up survey, that there is no structural diminution and the hard protective coatings are found to be in a GOOD condition.
- Where Substantial Corrosion is found, the extent of thickness measurements is to increased in accordance with the requirements of Table III/4. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

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

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

- Where the hard protective coating in cargo holds, as defined by Z9 is found to be in GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered.

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

5.7.6 **Bulk Carriers 10 - 15 years of age**. The following is to apply:

5.7.6.1 The requirements of the Intermediate Survey are to be to the same extent to the previous Special Survey as required in 2 and 5.1. However, internal examination of fuel tanks and pressure testing of all tanks are not required unless deemed necessary by the attending surveyor.

5.7.6.2 In application of 4.2.3.1, the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of 2.1.4.

5.7.6.3 In application of 4.2.3.1, an under water survey may be considered in lieu of the requirements of 2.2.2.

5.7.7 Bulk Carriers over 15 years of age. The following is to apply:

5.7.7.1 The requirements of the Intermediate Survey are to be to the same extent to the previous Special Survey as required in 2 and 5.1. However, internal examination of fuel tanks and pressure testing of all tanks are not required unless deemed necessary by the attending surveyor.

5.7.7.2 In application of 4.2.4.1, the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of 2.1.4.

5.7.7.3 In application of 4.2.4.1, a survey in dry dock is to be part of the intermediate survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo holds and water ballast tanks are to be carried out in accordance with the applicable requirements for intermediate surveys, if not already performed.

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

Section 6 – Surveys for Oil Tankers

6.1 General requirements

6.1.1 The requirements apply to all self-propelled Oil Tankers other than Double Hull Oil Tankers.

6.1.2 The requirements apply to surveys of hull structure and piping systems in way of cargo tanks, pump rooms, cofferdams, pipe tunnels, void spaces within the cargo area and all ballast tanks. The requirements are additional to the classification requirements applicable to the remainder of the ship. Refer to Section 2.

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

6.2 Procedures for Thickness measurements

6.2.1 The required thickness measurements, if not carried out by the DBS Society itself, are to be witnessed by a Surveyor of the DBS Society. The Surveyor is to be on board to the extent necessary to control the process.

6.2.2 The thickness measurement company is to be part of the survey planning meeting to be held prior to commencing the survey.

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

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

6.2.5 The thickness measurements are to be carried out by a qualified company certified by the DBS Society.

6.2.6 A thickness measurement report is to be prepared. The report is to give the location of measurements, the thickness measured as well as corresponding original thickness. Furthermore, the report is to give the date when the measurements were carried out, type of measurement equipment, names of personnel and their qualifications and has to be signed by the operator. The thickness measurement report is to follow the principles as specified in the Recommended Procedures for Thickness Measurements for Oil Tankers, Ore/Oil Ships and etc., contained in Part 8/Ch 1/Sec 3.

6.2.7 The Surveyor is to review the final thickness measurement report and countersign the cover page.

6.3 Renewal Survey-Additional items for hull

6.3.1 The herein requirements are provided in addition to those mentioned in Section 4.

6.3.2 An Overall Survey of all tanks and spaces is to be carried out at each Special Survey.

6.3.3 The minimum requirements for Close-up Surveys at Special Survey are given in Table I.

6.3.4 The Surveyor may extend the Close-up Survey as deemed necessary taking into account the maintenance of the tanks under survey, the condition of the corrosion prevention system and also in the following cases:

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

6.3.5 For areas in tanks where hard protective coatings are found to be in a GOOD condition as defined in 1.7.19 of Part 1, Chapter 3, Section 1, the extent of Close-up Surveys according to Table I may be specially considered.

6.3.6 The minimum requirements for thickness measurements at Special Survey are given in Table II.

6.3.7 Provisions for extended measurements for areas with Substantial Corrosion are given in Table IV. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous surveys

are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

6.3.8 The Surveyor may further extend the thickness measurements as deemed necessary.

6.3.9 For areas in tanks where hard protective coating is found to be in a GOOD condition as defined in 1.7.19 of Part 1, Chapter 3, Section 1, the extent of thickness measurements according to Table II may be specially considered.

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

6.3.11 In cases where two or three sections are to be measured, at least one is to include a Ballast Tank within 0.5L amidships.

In case of oil tankers of 130m in length and upwards and more than 10 years of age, for the evaluation of the ship's longitudinal strength, the sampling method of thickness measurements is to be evaluated during the **special survey.** The sampling method should be based on the following principles:

6.3.11.1 transverse sections should be chosen such that thickness measurements can be taken for as many different tanks in corrosive environments as possible.

6.3.11.2 The minimum number of transverse sections to be sampled should be in accordance with Table II.

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

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

6.3.11.5 For longitudinal members other than those specified in 2.4 to be measured at each transverse section in accordance with the requirements of Table II, every longitudinal and girder should be measured on the web and face plate, and every plate should be measured at least in one point per strake.

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

6.3.12 The minimum requirements for ballast tank testing at Special Survey are given in 6.3.16 and Table III.

6.3.13 The minimum requirements for cargo tank testing at Special Survey are given in 6.3.17 and Table III.

6.3.14 Cargo tank testing carried out by the vessel's crew under the direction of the Master may be accepted by the surveyor provided the following conditions are complied with:

6.3.14.1 a tank testing procedure, specifying fill heights, tanks being filled and bulkheads being tested, has been submitted by the owner and reviewed by the Society prior to the testing being carried out;

6.3.14.2 there is no record of leakage, distortion or substantial corrosion that would affect the structural integrity of the tank;

6.3.14.3 the tank testing has been satisfactorily carried out within special survey window not more than 3 months prior to the date of the survey on which the overall or close up survey is completed;

6.3.14.4 the satisfactory results of the testing is recorded in the vessel's logbook;

6.3.14.5 the internal and external condition of the tanks and associated structure are found satisfactory by the surveyor at the time of the overall and close up survey.

6.3.15 The Surveyor may extend the tank testing as deemed necessary.

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

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

Special Survey No. 1 $Age \leq 5$	**Special Survey No. 2** $5 < Age \leq 10$	**Special Survey No. 3** $10 < Age \leq 15$	**Special Survey No. 4 and Subsequent** $Age > 15$
ONE WEB FRAME RING - in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast Complete transverse web frame ring including adjacent structural members	ALL WEB FRAME RINGS - in a ballast wing tank, if any, or a cargo wing tank, used primarily for water ballast Complete transverse web frame ring including adjacent structural members	ALL WEB FRAME RINGS - in all ballast tanks Complete transverse web frame ring including adjacent structural members	As special survey No.3
ONE DECK TRANSVERSE - in a cargo oil tank Deck transverse including adjacent deck structural members	ONE DECK TRANSVERSE - in each of the remaining ballast tanks, if any Deck transverse including adjacent deck structural members	ALL WEB FRAME RINGS - in a cargo wing tank Complete transverse web frame ring including adjacent structural members	Additional transverses included as deemed necessary by the Classification Society
ONE TRANVERSE BULKHEAD - in a ballast tank Transverse bulkhead lower part – including girder system and adjacent structural members	ONE DECK TRANSVERSE - in a cargo wing tank Deck transverse including adjacent deck structural members	A minimum of 30% of all web frame rings in each remaining cargo wing tank (The 30% is to be rounded up to the next whole integer) Complete transverse web frame ring including adjacent structural members	
ONE TRANSVERSE BULKHEAD - in a cargo oil wing tank Transverse bulkhead lower part – including girder system and adjacent structural members	ONE DECK TRANSVERSE - in two cargo centre tanks Deck transverse including adjacent deck structural members	ALL TRANSVERSE BULKHEADS - in all cargo and ballast tanks Transverse bulkhead complete – including girder system and adjacent structural members	
ONE TRANSVERSE BULKHEAD - in a cargo oil centre tank Transverse bulkhead lower part – including girder system and adjacent structural members	BOTH TRANSVERSE BULKHEADS - in a wing ballast tank, if any, or a cargo wing tank used primarily for water ballast Transverse bulkhead complete – including girder system and adjacent structural members	A minimum of 30% of deck and bottom transverses including adjacent structural members in each cargo centre tank Deck and bottom transverse including adjacent structural members	
	ONE TRANSVERSE BULKHEAD - in each remaining ballast tank	As considered necessary by the surveyor	

	Transverse bulkhead lower part – including girder system and adjacent structural members	Additional complete transverse web frame ring	
	ONE TRANSVERSE BULKHEAD - in a cargo oil wing tank Transverse bulkhead lower part – including girder system and adjacent structural members		
	ONE TRANSVERSE BULKHEAD - in two cargo centre tanks Transverse bulkhead lower part – including girder system and adjacent structural members		

Table I: Minimum Requirements to Close-up Surveys at Special Survey of Oil Tankers, Ore/Oil Ships and etc.

Special Survey No. 1 $Age \leq 5$	**Special Survey No. 2** $5 < Age \leq 10$	**Special Survey No. 3** $10 < Age \leq 15$	**Special Survey No. 4 and Subsequent** $Age > 15$
1. Suspect areas	1. Suspect areas	1. Suspect areas	1. Suspect areas
2. One section of deck plating for the full beam of the ship within the cargo area (in way of a ballast tank, if any, or a cargo tank used primarily for water ballast)	2. Within the cargo area: a. Each deck plate b. One transverse section (at least one section is to include a ballast tank within 0.5L amidships)	2. Within the cargo area: a. Each deck plate b. Two transverse section (at least one section is to include a ballast tank within 0.5L amidships) c. All wind and water strakes	2. Within the cargo area: a. Each deck plate b. Three transverse section (at least one section is to include a ballast tank within 0.5L amidships) c. Each bottom plate
	3. Selected wind and water strakes outside the cargo area	3. Selected wind and water strakes outside the cargo area	3. All wind and water strakes, full length
Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.

Table II: Minimum requirements to thickness measurements at special survey of oil tankers, ore/oil ships and etc.

Special Survey No. 1 $Age \leq 5$	**Special Survey No. 2** $Age > 5$
All ballast tank boundaries	All ballast tank boundaries
Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, pump-rooms or cofferdams	All cargo tank bulkheads

Table III: Minimum requirements to Tank Testing at Special Survey of Oil Tankers, Ore/Oil Ships and etc.

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
1. Bottom plating	Minimum of 3 bays across tank aft bay Measurements around and under all bell mouths	5-point pattern for each panel between longitudinals and webs
2. Bottom Longitudinals	Minimum of 3 longitudinals in each bay where bottom plating measured	3 measurements in line across flange and 3 measurements on vertically web
3. Bottom girders and brackets	At fore and aft transverse bulkhead bracket toes and in centre of tanks	Vertical line of single measurements on web plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across face flat. 5-point pattern on girder/bhd brackets.
4. Bottom transverse webs	3 webs in bays where bottom plating measured, with measurements at both ends and middle	5-point pattern over 2 square metre area. Single measurements on face flat.
5. Panel stiffening	Where provided	Single measurements

Table IV/1: Requirements for extent of thickness measurement at those areas of substantial corrosion. Special Survey of Oil Tankers, Ore/Oil Ships and etc. within the cargo tank length. - ***BOTTOM STRUCTURE***

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
1. Deck plating	Two bands across tank	Minimum of three measurements per plate per band
2. Deck Longitudinals	Minimum of 3 longitudinals in each of two bays	3 measurements in line vertically on webs, and 2 measurements on flange (if fitted)
3. Deck girders and brackets	At fore and aft transverse bulkhead, bracket toes and in centre of tanks	Vertical line of single measurements on web plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across face flat. 5 point pattern on girder/bhd brackets.
4. Deck transverse webs	Minimum of two webs with measurements at middle and both ends of span	5 point pattern over about 2 square metre areas. Single measurements on face flat.
5. Panel stiffening	Where provided	Single measurements

Table IV/2: Requirements for extent of thickness measurement at those areas of substantial corrosion. Special Survey of Oil Tankers, Ore/Oil Ships and etc. within the cargo tank length. - ***DECK STRUCTURE***

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
1. Deckhead and bottom strakes, and strakes in way of stringer platforms	Plating between each pair of longitudinals in a minimum of 3 bays	Single measurement
2. All other strakes	Plating between every 3rd pair of longitudinals in same 3 bays	Single measurement
3. Longitudinals	Each longitudinal in same 3	3 measurements across web

- deckhead and bottom strakes	bays	and 1 measurement on flange
4. Longitudinals - all others	Every third longitudinal in same 3 bays	3 measurements across web and 1 measurement on flange
5. Longitudinals - bracket	Minimum of three at top, middle and bottom of tank in same 3 bays	5 point pattern over area of bracket
6. Web frames and cross ties	3 webs with minimum of three locations on each web, including in way of cross tie connections	5 point pattern over about 2 square metre area, plus single measurements on web frame and cross tie face flats

Table IV/3: Requirements for extent of thickness measurement at those areas of substantial corrosion. Special Survey of Oil Tankers, Ore/Oil Ships and etc. within the cargo tank length. - ***DECK STRUCTURE***

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
1. Deckhead and bottom strakes, and strakes in way of stringer platforms	Plating between pair of stiffeners at three locations - approx. 1/4, 1/2 and 3/4 width of tank	5 points pattern between stiffeners over 1 metre length
2. All other strakes	Plating between pair of stiffeners at middle location	Single measurement
3. Strakes in corrugated bulkheads	Plating for each change of scantling at centre of panel and at flange or fabricated connection	5 point pattern over about 1 square metre of plating
4. Stiffeners	Minimum of three typical stiffeners	For web, 5 point pattern over span between bracket connections (2 measurements across web at each bracket connection, and one at centre of span). For flange, single measurements at each bracket toe and at centre of span
5. Brackets	Minimum of three at top, middle and bottom of tank	5 point pattern over areas of bracket
6. Deep webs and girders	Measurements at toe of bracket and at centre of span	For web, 5 point pattern over about 1 square metre. 3 measurements across face flat.
7. Stringer platforms	All stringers with measurements at both ends and middle	5 point pattern over 1 square metre of area plus single measurements near bracket toes and on face flats

Table IV/4: Requirements for extent of thickness measurement at those areas of substantial corrosion. Special Survey of Oil Tankers, Ore/Oil Ships and etc. within the cargo tank length. - ***TRANSVERSE BULKHEADS AND SWASH BULKHEADS***

6.4 Renewal Survey-Additional items for machinery

6.4.1 For the life-saving appliances and the other equipment of cargo ships, concerning the additional requirements for tankers the renewal survey should consist of:

6.4.1.1 confirming during the examination of the fixed firefighting system for the cargo pump rooms that, as appropriate, any foam compounds have been checked and that the distribution pipework has been proved clear and checking the operation of the remote means for closing the various openings

6.4.1.2 checking the deck foam system, including the supplies of foam concentrate and testing that the minimum number of jets of water at the required pressure in the fire main is obtained when the system is in operation

6.4.1.3 examining the inert gas system and in particular:

- examining externally for any sign of gas or effluent leakage;
- confirming the proper operation of both inert gas blowers;
- observing the operation of the scrubber-room ventilation system;
- checking the deck water seal for automatic filling and draining;
- examining the operation of all remotely operated or automatically controlled valves and, in particular, the flue gas isolating valves;
- observing a test of the interlocking feature of soot blowers;
- observing that the gas pressure regulating valve automatically closes when the inert gas blowers are secured;
- checking, as far as practicable, the following alarms and safety devices of the inert gas system using simulated conditions where necessary:
  - high oxygen content of gas in the inert gas main;
  - low gas pressure in the inert gas main;
  - low pressure in the supply to the deck water seal;
  - high temperature of gas in the inert gas main;
  - low water pressure or low water-flow rate;
  - accuracy of portable and fixed oxygen-measuring equipment by means of calibration gas;
  - high water level in the scrubber;
  - failure of the inert gas blowers;
  - failure of the power supply to the automatic control system for the gas regulating valve and to the instrumentation for continuous indication and permanent recording of pressure and oxygen content in the inert gas main;
  - high pressure of gas in the inert gas main;

6.4.1.4 checking, when practicable, the proper operation of the inert gas system on completion of the checks listed above

6.4.1.5 examining the fixed firefighting system for the cargo pump rooms and confirming, as far as practicable and when appropriate, the operation of the remote means for closing the various openings

6.4.1.6 checking for all tankers, the provision of at least one portable instrument for measuring oxygen and one for measuring flammable vapour concentrations, together with a sufficient set of spares, and suitable means for the calibration of these instruments

6.4.1.7 examining the arrangements for gas measurement in double-hull spaces and double bottom spaces, including the fitting of permanent gas sampling lines, where appropriate

6.4.1.8 examining, as far as possible, and testing the fixed hydrocarbon gas detection system

6.4.1.9 checking condition and operation of water spray and air supply systems that are in totally enclosed lifeboats and have self-contained air support systems

6.4.1.10 checking protection of cargo pump room and in particular:
- checking temperature sensing devices for bulkhead glands and alarms;
- checking interlock between lighting and ventilation;
- checking gas detection system;
- checking bilge level monitoring devices and alarms.

6.4.1.11 examining the deck water seal for the inert gas system internally and checking the condition of the non-return valve

6.4.5 For the hull, machinery and equipment of cargo ships, concerning the **additional requirements for oil tankers**, the renewal survey should consist of:

6.4.5.1 confirming, when appropriate, that the requisite arrangements to regain steering capability in the event of the prescribed single failure are being maintained

6.4.5.2 examining the cargo tank openings, including gaskets, covers, coamings and screens;

6.4.5.3 examining the cargo tank pressure/vacuum valves and devices to prevent the passage of flame

6.4.5.4 examining the devices to prevent the passage of flame on vents to all bunker, oily-ballast and oily-slop tanks and void spaces, as far as practicable;

6.4.5.5 examining the cargo tank venting, cargo tank purging and gas-freeing and other ventilation systems

6.4.5.6 examining the cargo, crude oil washing, ballast and stripping systems both on deck and in the cargo pump rooms and the bunker system on deck;

6.4.5.7 confirming that all electrical equipment in dangerous zones is suitable for such locations, is in good condition and is being properly maintained;

6.4.5.8 confirming that potential sources of ignition in or near the cargo pump room are eliminated, such as loose gear, combustible materials, etc., that there are no signs of undue leakage and that access ladders are in good condition;

6.4.5.9 examining all pump room bulkheads for signs of oil leakage or fractures and, in particular, the sealing arrangements of all penetrations of cargo pump room bulkheads;

6.4.5.10 examining, as far as practicable, the cargo, bilge, ballast and stripping pumps for undue gland seal leakage, verification of proper operation of electrical and mechanical remote operating and shutdown devices and operation of cargo pump room bilge system, and checking that pump foundations are intact;

6.4.5.11 confirming that the pump room ventilation system is operational, ducting intact, dampers are operational and screens clean;

6.4.5.12 verifying that installed pressure gauges on cargo discharge lines and level indicator systems are operational;

6.4.5.13 examining access to bow arrangement

6.4.5.14 examining the towing arrangement for tankers of not less than 20,000 tonnes deadweight

6.4.5.15 confirming that the corrosion prevention system fitted to dedicated ballast water tanks of oil tankers and bulk carriers when appropriate is maintained

6.4.5.16 confirming that the coating system in cargo oil tanks of crude oil tankers, when appropriate, is maintained and that in-service maintenance and repair activities are recorded in the coating technical file

6.4.5.17 examining the emergency lighting in all cargo pump rooms of tankers constructed after 1 July 2002

6.4.5.18 examining, for oil tankers of 150 m in length and above, where appropriate, the ship's structure in accordance with the Ship Construction File, taking into account identified areas that need special attention

6.4.5.19 should there be any doubt as to its condition when examining the various piping systems, the piping may be required to be pressure tested, gauged or both. Particular attention is to be paid to repairs such as welded doublers;

6.4.5.20 for ships over 10 years of age an internal examination of selected cargo spaces;

6.4.5.21 testing the insulation resistance of electrical circuits in dangerous zones such as cargo pump rooms and areas adjacent to cargo tanks, but in cases where a proper record of testing is maintained, consideration should be given to accepting recent readings.

6.4.6 For oil pollution prevention the renewal survey of the additional requirements for oil tankers should consist of:

6.4.6.1 examining the oil discharge monitoring and control system and its associated equipment:
- examining externally the system and equipment and, if applicable, verifying that the instrument is properly sealed;
- confirming, as far as practicable, the satisfactory operation of the oil discharge monitoring and control system including the oil content meter and, where applicable, the automatic and manual means provided to stop the discharge of effluent and the starting interlock;
- observing that indicators and recording devices are operable and verifying that sufficient supply of consumables for the recorders are on board;
- testing, as far as practicable, any audible or visual alarms fitted to the oil discharge monitoring and control system;

6.4.6.2 examining, as far as practicable, the oil/water interface detectors

6.4.6.3 confirming that no cross-connections have been fitted between the cargo and segregated ballast systems

6.4.6.4 where a portable spool piece is provided for the emergency discharge of segregated ballast by connecting the segregated ballast system to a cargo pump, confirming that non-return valves are fitted on the segregated ballast connections and that the spool piece is mounted in a conspicuous position in the pump room with a permanent notice restricting its use

6.4.6.5 confirming by sighting that there has been no contamination with oil in the segregated ballast tanks

6.4.6.6 confirming, as far as practicable, that the dedicated clean ballast tank arrangement remains satisfactory

6.4.6.7 confirming by sighting that there has been no contamination with oil in the dedicated clean ballast tanks

6.4.6.8 confirming, as far as practicable, that the crude oil washing system remains satisfactory:
- examining externally the crude oil washing piping, pumps, valves and deck mounted washing machines for signs of leakage and checking that all anchoring devices for crude oil washing piping are intact and secure;
- confirming, in those cases where drive units are not integral with the tank cleaning machines, that the number of operational drive units as specified in the Manual are on board;
- checking that, when fitted, steam heaters for water washing can be properly isolated during crude oil washing operations, either by double shut-off valves or clearly identifiable blanks;
- checking that the prescribed means of communications between the deck watch keeper and the cargo control position is operational;
- confirming that an overpressure relief device (or other approved arrangement) is fitted to the pumps supplying the crude oil washing systems;
- confirming that flexible hoses for supply of oil to the washing machines on combination carriers, are of an approved type, are properly stored and are in good condition;

6.4.6.9 verifying, where applicable and as far as practicable, the effectiveness of the crude-oil washing system
- checking tanks containing departure and/or arrival ballast water, as applicable, to confirm the effectiveness of the cleaning and stripping;
- checking, as far as practicable, that the crude oil washing machines are operable and, when the survey is carried out during crude oil washing operations, observing the proper operation of the washing machines by means of the movement indicators and/or sound patterns or other approved methods;
- checking, as far as practicable, the effectiveness of the stripping system in appropriate cargo tanks by observing the monitoring equipment and by hand-dipping or other approved means;

6.4.6.10 confirming that on those existing tankers operating with special ballast arrangements, the arrangements are as approved and are satisfactory

6.4.6.11 confirming, as appropriate and as practicable, that the arrangements for the prevention of oil pollution in the event of collision or stranding are approved and are satisfactory

6.4.6.12 examining the piping systems associated with the discharge of dirty ballast or oil-contaminated water including the part flow system, if fitted

6.4.6.13 testing the communication system between the observation and discharge control positions

6.4.6.14 examining the means of draining cargo pumps and cargo lines, including the stripping device and the connections for pumping to the slop or cargo tanks or ashore

6.4.6.15 confirming for oil tankers of 5,000 tonnes deadweight and above that arrangements are in place to provide prompt access to shore-based damage stability and residual structural strength computerized calculation programs

6.4.6.16 examining the oil discharge monitoring and control system and the oil content meter for obvious defects, deterioration or damage, and checking the record of calibration of the meter when done in accordance with the manufacturer's operational and instruction manual

6.4.6.17 confirming the satisfactory operation of the oil/water interface detectors

6.4.6.18 for the crude oil washing system

6.4.6.19 examining the crude oil washing piping outside the cargo tanks. If upon examination there is any doubt as to its condition, the piping may be required to be pressure tested, gauged or both. Particular attention should be paid to any repairs such as welded doublers;

6.4.6.20 confirming the satisfactory operation of the isolation valves to steam heaters for washing water, when fitted;

6.4.6.21 examining at least two selected cargo tanks for the express purpose of verifying the continued effectiveness of the installed crude oil washing and stripping systems. If the tank cannot be gas-freed for the safe entry of the surveyor, an internal examination should not be conducted.

6.4.6.22 examining the manual and/or remote operation of the individual tank valves (or other similar closing devices) to be kept closed at sea

6.4.6.23 confirming that the arrangements of slop tanks or cargo tanks designated as slop tanks and associated piping systems are satisfactory

6.4.6.24 confirming, if necessary by simulated test or equivalent, the satisfactory operation of the oil discharge monitoring and control system and its associated equipment, including the oil/water interface detectors

6.4.6.25 confirming that the arrangements of pumps, pipes and valves are in accordance with the requirements for SBT systems

6.4.6.26 confirming that the arrangements of pumps, pipes and valves are in accordance with the Revised Specifications for Oil Tankers with Dedicated Clean Ballast Tanks

6.4.6.27 confirming that the crude oil washing system is in accordance with the requirements for such systems and, in particular:
- carrying out pressure testing of the crude oil washing system to at least the working pressure;
- examining the cargo tanks for the express purpose of verifying the continued effectiveness of the installed crude oil washing and stripping systems;
- examining internally, when fitted, the isolation valves for any steam heaters;

6.4.6.28 verifying, by internal tank inspection or by another alternative method acceptable to the Administration, the effectiveness of the crude oil washing system. If the tank cannot be gas-freed for the safe entry of the surveyor, an internal inspection should not be conducted.

6.4.6.29 confirming that there is no leakage from those ballast pipelines passing through cargo tanks and those cargo pipelines passing through ballast tanks

6.4.6.30 confirming that the pumping, piping and discharge arrangements are satisfactory and, in particular:
- confirming that the piping systems associated with the discharge of dirty ballast water or oil contaminated water are satisfactory;
- confirming that the means of draining cargo pumps and cargo lines, including the stripping device and the connections for pumping to the slop or cargo tanks or ashore are satisfactory;
- confirming that the arrangements for the part flow system, where fitted, are satisfactory;

6.4.6.31 confirming that closing devices installed in the cargo transfer system and cargo piping as appropriate are satisfactory

6.4.6.32 confirming, as appropriate and as practicable, that the arrangements for the prevention of oil pollution in the event of collision or stranding are satisfactory

6.4.6.33 confirming for oil tankers of 5,000 tonnes deadweight and above that arrangements are in place to provide prompt access to shore based damage stability and residual structural strength computerized calculation programs

6.5 Annual Survey-Additional items

6.5.1 Annual Surveys are to be held within 3 months before or after anniversary date from the date of the initial classification survey or of the date credited for the last Special Survey.

6.5.2 The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull and piping are maintained in a satisfactory condition.

6.5.3 Examination of the Hull

6.5.3.1 Examination of the hull plating and its closing appliances as far as can be seen.

6.5.3.2 Examination of watertight penetrations as far as practicable.

6.5.4 Examination of weather decks

6.5.4.1 Examination of cargo tank openings including gaskets, covers, coamings and flame screens.

6.5.4.2 Examination of cargo tanks pressure/vacuum valves and flame screens.

6.5.4.3 Examination of flame screens on vents to all bunker tanks.

6.5.4.4 Examination of cargo, crude oil washing, bunker and vent piping systems, including vent masts and headers.

6.5.4.5 Examination of Cargo pump rooms and pipe tunnels if fitted.

6.5.4.6 Examination of all pump room bulkheads for signs of oil leakage or fractures and, in particular, the sealing arrangements of all penetrations of pump room bulkheads.

6.5.4.7 Examination of the condition of all piping systems.

6.5.5 Examination of Ballast Tanks

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

6.6 Intermediate survey- Additional items

6.6.1 The Intermediate Survey is to be held at or between either the 2nd or 3rd Annual Survey.

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

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

6.6.4 The survey extent is dependent on the age of the vessel as specified in 6.6.6 to 6.6.8.

6.6.5 For weather decks, an examination as far as applicable of cargo, crude oil washing, bunker, ballast, steam and vent piping systems as well as vent masts and headers is to be carried out. If upon examination there is any doubt as to the condition of the piping, the piping may be required to be pressure tested, thickness measured or both.

6.6.6 **Oil Tankers 5 – 10 Years of Age**, the following is to apply:

6.6.6.1 All Ballast Tanks are to be examined. When considered necessary by the surveyor, thickness measurement and testing are to be carried out to ensure that the structural integrity remains effective.

6.6.6.2 A Ballast Tank is to be examined at subsequent annual intervals where:
- a hard protective coating has not been applied from the time of construction, or
- a soft or semi-hard coating has been applied, or
- substantial corrosion is found within the tank, or
- the hard protective coating is found to be in less than GOOD condition and the hard protective coating is not repaired to the satisfaction of the Surveyor.

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

6.6.7 **Oil Tankers 10 - 15 years of Age**, the following is to apply:

6.6.7.1 The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 2 and 5.1. However, pressure testing of cargo and ballast tanks and the requirements for longitudinal strength evaluation of Hull Girder as required in 8.1.1.1 are not required unless deemed necessary by the attending Surveyor.

6.6.7.2 In application of 4.2.3.1, the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of 2.1.4.

6.6.7.3 In application of 4.2.3.1, an under water survey may be considered in lieu of the requirements of 2.2.2.

6.6.8 **Oil Tankers over 15 years of Age**, the following is to apply:

6.6.8.1 The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 2 and 5.1. However, pressure testing of cargo and ballast tanks and the requirements for longitudinal strength evaluation of Hull Girder as required in 8.1.1.1 are not required unless deemed necessary by the attending Surveyor.

6.6.8.2 In application of 4.2.4.1, the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of 2.1.4.

6.6.8.3 In application of 4.2.4.1, a survey in dry dock is to be part of the intermediate survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo tanks and water ballast tanks are to be carried out in accordance with the applicable requirements for intermediate surveys, if not already performed.

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

Section 7 – Surveys for Chemical Tankers

7.1 General requirements

7.1.1 The requirements apply to all self-propelled Chemical Tankers with integral tanks i.e. vessels with IMO certificate of fitness for the carriage of dangerous chemicals in bulk. If a chemical tanker is constructed with both integral and independent tanks, these requirements are applicable only to that portion of the cargo length containing integral tanks. Combined gas carriers/chemical tankers with independent tanks within the hull, are to be surveyed as gas carriers.

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

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

7.2 Thickness measurements and close-up surveys

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

7.3 Extent of Overall and Close-up Survey

7.3.1 An Overall Survey of all tanks and spaces is to be carried out at each Special Survey. The minimum requirements for Close-up Surveys at Special Survey are given in Table I. The survey of stainless steel tanks may be carried out as an overall survey supplemented by Close-up Survey as deemed necessary by the surveyor.

7.3.2 The Surveyor may extend the Close-up Survey as deemed necessary taking into account the maintenance of the tanks under survey, the condition of the corrosion prevention system and also in the following cases:

7.3.2.1 In particular, tanks having structural arrangements or details which have suffered defects in similar tanks or on similar ships according to available information.

7.3.2.2 In tanks which have structures approved with reduced scantlings due to an approved corrosion control system.

7.3.3 For areas in tanks where hard protective coatings are found to be in a GOOD condition as defined in 1.2.11, the extent of Close-up Surveys according to Table I may be specially considered.

7.4 Renewal Survey-Additional items for hull

7.4.1 The herein requirements are provided in addition to those mentioned in Section 4.

7.4.2 An Overall Survey of all tanks and spaces is to be carried out at each Special Survey.

7.4.3 The minimum requirements for Close-up Surveys at Special Survey are given in Table I. The survey of stainless steel tanks may be carried out as an overall survey supplemented by Close-up Survey as deemed necessary by the surveyor.

7.4.4 The Surveyor may extend the Close-up Survey as deemed necessary taking into account the maintenance of the tanks under survey, the condition of the corrosion prevention system and also in the following cases:

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

7.4.5 For areas in tanks where hard protective coatings are found to be in a GOOD condition as defined in 1.7.19 of Part 1, Chapter 3, Section 1, the extent of Close-up Surveys according to Table I may be specially considered.

7.4.6 The minimum requirements for thickness measurements at Special Survey are given in Table II.

7.4.7 Provisions for extended measurements for areas with Substantial Corrosion are given in Table IV. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

7.4.8 The Surveyor may further extend the thickness measurements as deemed necessary.

7.4.9 For areas in tanks where hard protective coating is found to be in a GOOD condition as defined in 1.7.19 of Part 1, Chapter 3, Section 1, the extent of thickness measurements according to Table II may be specially considered.

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

7.4.11 In cases where two or three sections are to be measured, at least one is to include a Ballast Tank within 0.5L amidships.

7.4.12 The minimum requirements for ballast tank testing at Special Survey are given in 7.4.16 and Table III.

7.4.13 The minimum requirements for cargo tank testing at Special Survey are given in 7.4.17 and Table III.

7.4.14 Cargo tank testing carried out by the vessel's crew under the direction of the Master may be accepted by the surveyor provided the following conditions are complied with:

7.4.14.1 a tank testing procedure, specifying fill heights, tanks being filled and bulkheads being tested, has been submitted by the owner and reviewed by the Society prior to the testing being carried out;

7.4.14.2 there is no record of leakage, distortion or substantial corrosion that would affect the structural integrity of the tank;

7.4.14.3 the tank testing has been satisfactorily carried out within special survey window not more than 3 months prior to the date of the survey on which the overall or close up survey is completed;

7.4.14.4 the satisfactory results of the testing are recorded in the vessel's logbook;

7.4.14.5 the internal and external condition of the tanks and associated structure are found satisfactory by the surveyor at the time of the overall and close up survey.

7.4.15 The Surveyor may extend the tank testing as deemed necessary.

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

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

7.4.18 The testing of double bottom tanks and other spaces not designed for the carriage of liquid may be omitted, provided a satisfactory internal examination together with an examination of the tanktop is carried out.

7.4.19 For **Chemical Tankers over 10 Years of Age,** selected steel cargo pipes outside cargo tanks and ballast pipes passing through cargo tanks are to be:

7.4.19.1 Thickness measured at random or selected pipe lengths to be opened for internal inspection;

7.4.19.2 Pressure tested to the maximum working pressure.

Special attention is to be given to cargo/slop discharge piping through Ballast Tanks and void spaces.

Special Survey No. 1 $Age \leq 5$	**Special Survey No. 2** $5 < Age \leq 10$	**Special Survey No. 3** $10 < Age \leq 15$	**Special Survey No. 4 and Subsequent** $Age > 15$
A.ONE WEB FRAME RING - in a ballast wing tank	A. ALL WEB FRAME RINGS - in a ballast wing tank or double bottom ballast tank (see Note I)	A.ALL WEB FRAME RINGS - in all ballast tanks	As special survey No.3
B. ONE DECK TRANSVERSE - in a cargo tank or on deck	B. ONE DECK TRANSVERSE - in each remaining ballast tank or on deck	A. ALL WEB FRAME RINGS - in a cargo wing tank	
	B. ONE DECK TRANSVERSE - in a cargo wing tank or on deck		
D. ONE TRANVERSE BULKHEAD - lower part in a ballast tank	B. ONE DECK TRANSVERSE - in two cargo centre tanks or on deck	A. ONE WEB FRAME RING - in each remaining cargo tank	
D. ONE TRANSVERSE BULKHEAD - lower part in a cargo wing tank	C. BOTH TRANSVERSE BULKHEADS - in a ballast wing tank	C. ALL TRANSVERSE BULKHEADS - in all cargo tanks	
D. ONE TRANSVERSE BULKHEAD - lower part in a cargo centre tank (see Note II)	D. ONE TRANSVERSE BULKHEAD - lower part in each remaining ballast tank	C. ALL TRANSVERSE BULKHEADS - in all ballast tanks	
	D. ONE TRANSVERSE BULKHEAD - lower part in two cargo centre tanks (see Note II)		
	D. ONE TRANSVERSE BULKHEAD - lower part in a cargo wing tank		
A) Complete transverse web frame ring including adjacent structural members. B) Deck transverse including adjacent deck structural members. C) Transverse bulkhead complete - including girder system and adjacent structural members. D) Transverse bulkhead lower part - including girder system and adjacent structural members.			

Table I/1: Minimum Requirements to Close-up Surveys at Special Survey of Single Skin Chemical Tankers

Note I: Ballast double hull tank: means double bottom tank plus double side tank plus double deck tank, as applicable, even if these tanks are separate.
Note II: Where no centre cargo tanks are fitted (as in case of centre longitudinal bulkhead), transverse bulkheads in wing tanks are to be surveyed.

Special Survey No. 1 $Age \leq 5$	**Special Survey No. 2** $5 < Age \leq 10$	**Special Survey No. 3** $10 < Age \leq 15$	**Special Survey No. 4 and Subsequent** $Age > 15$
1.ONE WEB FRAME RING - in a ballast double hull tank (see Note I)	1.ALL WEB FRAME RINGS - in a ballast wing tank or ballast double hull tank (see Note I)	1.ALL WEB FRAME RINGS - in all ballast tanks	As special survey No.3
2. ONE DECK TRANSVERSE - in a cargo tank or on deck	6. THE KNUCKLE AREA AND THE UPPER PART	7. ALL WEB FRAME RINGS - in a cargo wing tank	

	(3 metres approx) of one web frame in each remaining ballast tank		
4. ONE TRANSVERSE BULKHEAD - in a ballast tank (see Note I)		7. ONE WEB FRAME RING - in each remaining cargo tank	
5. ONE TRANSVERSE BULKHEAD - in a cargo wing Tank	2. ONE DECK TRANSVERSE - in two cargo tanks	3. ALL TRANSVERSE BULKHEADS - in all cargo tank	
5. ONE TRANSVERSE BULKHEAD - in a cargo centre tank (see Note II)	4. ONE TRANSVERSE BULKHEAD - in each ballast tank (see Note I)	4. ALL TRANSVERSE BULKHEADS - in all ballast Tanks	
	5. ONE TRANSVERSE BULKHEAD - in two cargo centre tanks (see Note II)		
	5. ONE TRANSVERSE BULKHEAD - in a cargo wing Tank		
(1): Web frame in a ballast tank means vertical web in side tank, hopper web in hopper tank, floor in double bottom tank and deck transverse in double deck tank (where fitted), including adjacent structural members. In fore and aft peak tanks web frame means a complete transverse web frame ring including adjacent structural members. **(2):** Deck transverse, including adjacent deck structural members (or external structure on deck in way of the tank, where applicable). **(3):** Transverse bulkhead complete in cargo tanks, including girder system, adjacent structural members (such as longitudinal bulkheads) and internal structure of lower and upper stools, where fitted. **(4):** Transverse bulkhead complete in ballast tanks, including girder system and adjacent structural members, such as longitudinal bulkheads, girders in double bottom tanks, inner bottom plating, hopper side, connecting brackets. **(5):** Transverse bulkhead lower part in cargo tank, including girder system, adjacent structural members (such as longitudinal bulkheads) and internal structure of lower stool, where fitted. **(6):** The *knuckle area* and the upper part (3 metres approximately), including adjacent structural members. *Knuckle area* is the area of the web frame around the connections of the slope hopper plating to the inner hull bulkhead and the inner bottom plating, up to 2 metres from the corners both on the bulkhead and the double bottom. **(7):** Web frame in a cargo tank means deck transverse, longitudinal bulkhead structural elements and cross ties, where fitted, including adjacent structural members.			

Table I/2: Minimum Requirements to Close-up Surveys at Special Survey of Double Skin Chemical Tankers

Note I: Ballast double hull tank: means double bottom tank plus double side tank plus double deck tank, as applicable, even if these tanks are separate.
Note II: Where no centre cargo tanks are fitted (as in the case of centre longitudinal bulkhead), transverse bulkheads in wing tanks are to be surveyed.

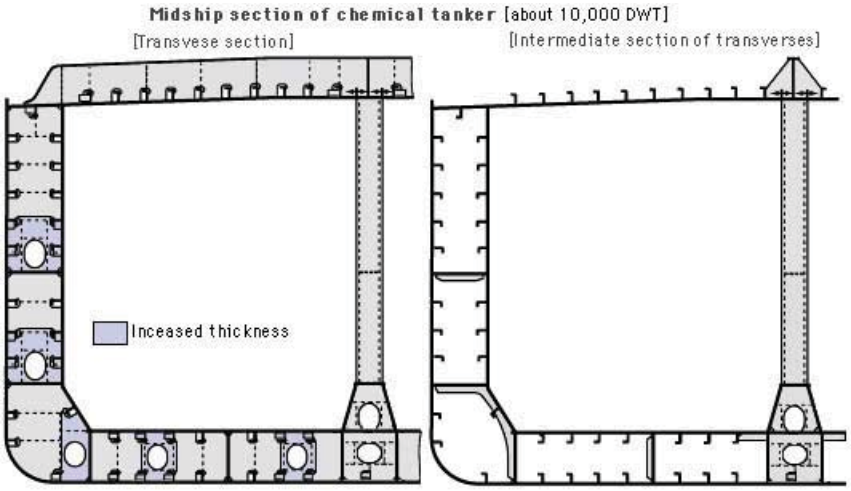


Fig. 2.1 Representative transverse section of chemical tanker. Areas A & B and 1 and 2

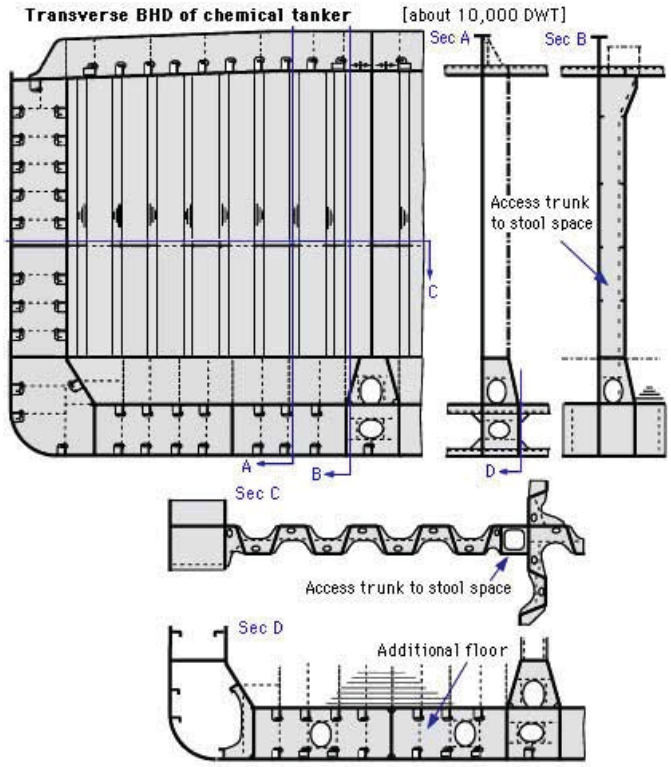
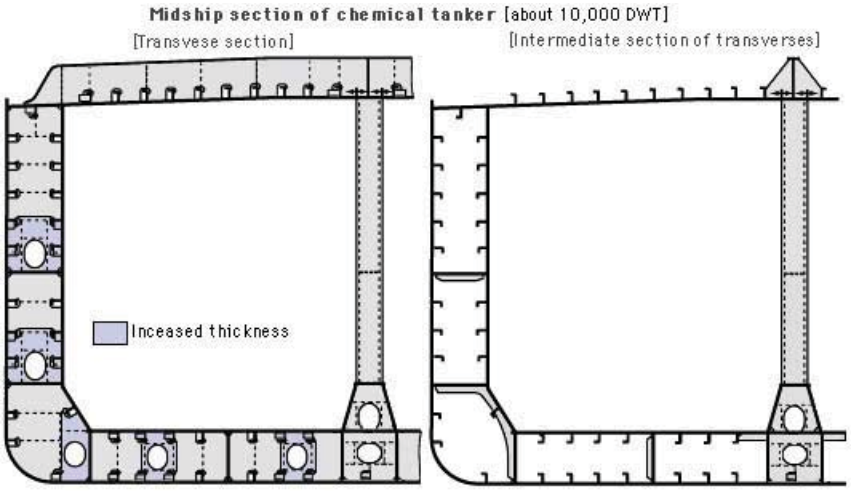


Fig. 2.2 Representative transverse section of chemical tanker. Areas C & D and 3, 4 and 5



Special Survey No. 1 $Age \leq 5$	**Special Survey No. 2** $5 < Age \leq 10$	**Special Survey No. 3** $10 < Age \leq 15$	**Special Survey No. 4 and Subsequent** $Age > 15$
1. Suspect areas	1. Suspect areas	1. Suspect areas	1. Suspect areas
2. One section of deck plating for the full beam of the ship within the cargo area (in way of a ballast tank, if any, or a cargo tank used primarily for water ballast)	2. Within the cargo area: c. Each deck plate d. One transverse section (at least one section is to include a ballast tank within 0.5L amidships)	2. Within the cargo area: a. Each deck plate b. Two transverse section (at least one section is to include a ballast tank within 0.5L amidships) c. All wind and water strakes	2. Within the cargo area: a. Each deck plate b. Three transverse section (at least one section is to include a ballast tank within 0.5L amidships) c. Each bottom plate
	3. Selected wind and water strakes outside the cargo area	3. Selected wind and water strakes outside the cargo area	3. All wind and water strakes, full length
4. Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I/1 or I/2, as applicable.	4. Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I/1 or I/2, as applicable.	4. Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I/1 or I/2, as applicable.	4. Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I/1 or I/2, as applicable.

Table II: Minimum requirements to thickness measurements at special survey of chemical tankers.

Special Survey No. 1 $Age \leq 5$	**Special Survey No. 2** $Age > 5$
All ballast tank boundaries	All ballast tank boundaries
Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, pump-rooms or cofferdams	All cargo tank bulkheads

Table III: Minimum requirements to Tank Testing at Special Survey of Chemical Tankers.

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
Bottom, inner bottom and hopper structure plating	Minimum of three bays across tank, including aft bay Measurements around and under all suction bell mouths	5-point pattern for each panel between longitudinals and floors
Bottom, inner bottom and hopper structure longitudinals	Minimum of three longitudinals in each bay where bottom plating measured	Three meaurements in line across the flange and three measurements on vertical web
Bottom girders, including the watertight ones	At fore and aft watertight floors and in centre of tan	Vertical line of single measurements on girder plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across face flat where fitted.
Bottom floors, including the watertight ones	Three floors in bays where bottom plating measured, with measurements at both ends and middle	5-point pattern over two square metre area
Hopper structure web frame ring	Three floors in bays where bottom plating measured	5-point pattern over one square metre of plating. Single measurements on Flange
Hopper structure transverse watertight bulkhead or swash bulkhead	- lower 1/3 of bulkhead	- 5-point pattern over one square metre of plating
	- upper 2/3 of bulkhead	- 5-point pattern over two square metre of plating
	- stiffeners (minimum of three)	- For web, 5-point pattern over span (two measurements across web at each end and one at centre of span). For flange, single measurements at each end and centre of span
Panel stiffening	Where applicable	Single measurements

Table IV/1: Requirements for extent of thickness measurement at those areas of substantial corrosion. Special Survey of Chemical Tankers. - ***BOTTOM, INNER BOTTOM AND HOPPER STRUCTURE***

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
Deck plating	Two bands across tank	Minimum of three measurements per plate per band
Deck Longitudinals	Every third longitudinal in each of two bands with a minimum of one longitudinal	Three measurements in line vertically on webs and two measurements on flange (if fitted)
Deck girders and brackets	At fore and aft transverse bulkhead, bracket toes and in centre of tanks	Vertical line of single measurements on web plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across flange. 5-point pattern on girder/bulkhead brackets

Deck transverse webs	Minimum of two webs, with measurements at both ends and middle of span	5-point pattern over one square metre area. Single measurements on flange
Vertical web and transverse bulkhead in wing ballast tank for double hull design (two metres from deck)	Minimum of two webs, and both transverse bulkheads	5-point pattern over one square metre area
Panel stiffening	Where applicable	Single measurements

Table IV/2: Requirements for extent of thickness measurement at those areas of substantial corrosion. Special Survey of Chemical Tankers. - ***DECK STRUCTURE***

STRUCTURAL MEMBER	**EXTENT OF MEASUREMENT**	**PATTERN OF MEASUREMENT**
Side shell and longitudinal bulkhead plating: -Deckhead and bottom strakes, and strakes in way of horizontal girders -All other strakes	-Plating between each pair of longitidinals in a minimum of three bays (along the tank) -Plating between every third pair of longitudinals in same three bays	Single measurement
Side shell and longitudinal bulkhead longitudinals on: -Deckhead and bottom Strakes -All other strakes	-Each longitudinal in same three bays -Every third longitudinal in same three bays	3 measurements across web and 1 measurement on flange
Longitudinals - brackets	Minimum of three at top, middle and bottom of tank in same three bays	5-point pattern over area of bracket
Vertical web and transverse bulkheads of double side tanks (excluding deck area): **-**Strakes in way of horizontal Girders **-**Other strakes	-Minimum of two webs and both transverse bulkheads -Minimum of two webs and both transverse bulkheads	-5-point pattern over approx. two square metre area -Two measurements between each pair of vertical stiffeners
Web frames and cross ties for other tanks than double side tanks	Three webs with minimum of three locations on each web, including in way of cross tie connections and lower end bracket	5-point pattern over approximately two square metre area of webs, plus single measurements on flanges of web frame and cross ties
Horizontal girders	Plating on each girder in a minimum of three bays	Two measurements between each pair of longitudinal girder stiffeners
Panel stiffening	Where applicable	Single measurements

Table IV/3: Requirements for extent of thickness measurement at those areas of substantial corrosion. Special Survey of Chemical Tankers. - ***SIDE SHELL AND LONGITUDINAL BULKHEADS***

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
Upper and lower stool, where fitted	-Transverse band within 25mm of welded connection to inner bottom/deck plating -Transverse band within 25mm of welded connection to shelf plate	5-point pattern between stiffeners over one metre length
Deckhead and bottom strakes, and strakes in way of horizontal stringers	Plating between pair of stiffeners at three locations: approximately 1/4, 1/2 and 3/4 width of tank	5-point pattern between stiffeners over one metre length
All other strakes	Plating between pair of stiffeners at middle location	Single measurement
Strakes in corrugated bulkheads	Plating for each change of scantling at centre of panel and at flange of fabricated connection	5-point pattern over about one square metre of plating
Stiffeners	Minimum of three typical stiffeners	For web, 5-point pattern over span between bracket connections (two measurements across web at each bracket connection and one at centre of span). For flange, single measurements at each bracket toe and at centre of span
Brackets	Minimum of three at top, middle and bottom of tank	5-point pattern over area of bracket
Horizontal stringers	All stringers with measurements at both ends and middle.	5-point pattern over one square metre area, plus single measurements near bracket toes and on flanges
Deep webs and girders	Measurements at toe of bracket and at centre of span	For web, 5 point pattern over about 1 square metre. 3 measurements across face flat.

Table IV/4: Requirements for extent of thickness measurement at those areas of substantial corrosion. Special Survey of Chemical Tankers. - ***TRANSVERSE BULKHEADS AND SWASH BULKHEADS***

7.5 Renewal Survey-Additional items for machinery

7.5.1 For the hull, machinery and equipment of cargo ships, **concerning the additional requirements for chemical tankers**, the renewal survey should consist of:

7.5.1.1 confirming, when appropriate, that the requisite arrangements to regain steering capability in the event of the prescribed single failure are being

7.5.1.2 examining the cargo tank openings, including gaskets, covers, coamings and screens;

7.5.1.3 examining the cargo tank pressure/vacuum valves and devices to prevent the passage of flame

7.5.1.4 examining the devices to prevent the passage of flame on vents to all bunker, oily-ballast and oily-slop tanks and void spaces, as far as practicable;

7.5.1.5 examining the cargo tank venting, cargo tank purging and gas-freeing and other ventilation systems

7.5.1.6 examining the cargo, crude oil washing, ballast and stripping systems both on deck and in the cargo pump rooms and the bunker system on deck;

7.5.1.7 confirming that all electrical equipment in dangerous zones is suitable for such locations, is in good condition and is being properly maintained;

7.5.1.8 confirming that potential sources of ignition in or near the cargo pump room are eliminated, such as loose gear, combustible materials, etc., that there are no signs of undue leakage and that access ladders are in good condition;

7.5.1.9 examining all pump room bulkheads for signs of oil leakage or fractures and, in particular, the sealing arrangements of all penetrations of cargo pump room bulkheads;

7.5.1.10 examining, as far as practicable, the cargo, bilge, ballast and stripping pumps for undue gland seal leakage, verification of proper operation of electrical and mechanical remote operating and shutdown devices and operation of cargo pump room bilge system, and checking that pump foundations are intact;

7.5.1.11 confirming that the pump room ventilation system is operational, ducting intact, dampers are operational and screens clean;

7.5.1.12 verifying that installed pressure gauges on cargo discharge lines and level indicator systems are operational;

7.5.1.13 examining access to bow arrangement

7.5.1.14 examining the towing arrangement for tankers of not less than 20,000 tonnes deadweight

7.5.1.15 confirming that the corrosion prevention system fitted to dedicated ballast water tanks of oil tankers and bulk carriers when appropriate is maintained

7.5.1.16 examining the emergency lighting in all cargo pump rooms of tankers constructed after 1 July 2002

7.5.2 For the carriage of noxious liquid substances in bulk the examination of current certificates and other records should consist of:

7.5.2.1 examining externally and confirming that the pumping and piping systems, including a stripping system if fitted, and associated equipment remain as approved.

7.5.2.2 examining externally the tank washing piping and confirming that the type, capacity, number, and arrangement of the tank washing machines are as approved.

7.5.2.3 examining externally the wash water heating system.

7.5.2.4 examining externally, as far as practicable, the underwater discharge arrangements

7.5.2.5 confirming that the means of controlling the rate of discharge of the residue is as approved.

7.5.2.6 confirming that the ventilation equipment for residue removal is as approved

7.5.2.7 examining externally, as far as is accessible, the heating system required for solidifying and high viscosity substances.

7.5.2.8 confirming, if possible, that the discharge outlet(s) are in good condition.

7.5.2.9 confirming that the ventilation equipment for residue removal is satisfactory and that the pressure in the driving medium for portable fans for ventilation equipment for residue removal can be achieved to give the required fan capacity.

7.5.2.10 confirming that the pumping and stripping systems are satisfactory and that portable pipes or bends in sufficient number, if required, are on board.

7.5.2.11 conducting the water test for assessing the stripping quantity, as required

7.5.2.12 confirming that the tank washing machines provided on board are in working order, are those described in the Procedures and Arrangements Manual and are installed in accordance with the approved plans

7.5.2.13 confirming that the wash water heating system, if required, is installed in accordance with the approved plans and is in working order

7.5.2.14 confirming that the number and position of tank cleaning openings for portable machines are in accordance with the approved plans

7.5.2.15 confirming that the underwater discharge outlet(s) are in good condition and are in accordance with the approved plans

7.5.2.16 verifying by actual test that the discharge rate of the pumps, where a variable rate type is used, can be controlled as specified in the Procedures and Arrangements Manual.

7.5.2.17 confirming that the ventilation equipment for residue removal is installed in accordance with the approved plan and is in working order.

7.5.2.18 confirming that the heating system for solidifying and high viscosity substances is installed in accordance with the approved plan and is in working order

7.5.3 For compliance with the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk the renewal survey of the structure, equipment, fittings, arrangements and materials should consist of:

7.5.3.1 examining externally and confirming that the pumping and piping systems, including a stripping system if fitted, and associated equipment remain as approved.

7.5.3.2 examining externally the tank washing piping and confirming that the type, capacity, number, and arrangement of the tank washing machines are as approved.

7.5.3.3 examining externally the wash water heating system.

7.5.3.4 examining externally, as far as practicable, the underwater discharge arrangements.

7.5.3.5 confirming that the means of controlling the rate of discharge of the residue is as approved.

7.5.3.6 confirming that the ventilation equipment for residue removal is as approved.

7.5.3.7 examining externally, as far as is accessible, the heating system required for solidifying and high viscosity substances.

7.5.3.8 examining any additional requirements listed on the International Certificate for the Carriage of Noxious Liquid Substances in Bulk.

7.5.3.9 verifying from the cargo record book that the pumping and stripping arrangements have been emptying the tanks efficiently and are all in working order.

7.5.3.10 confirming, if possible, that the discharge outlet(s) are in good condition.

7.5.3.11 confirming that the ventilation equipment for residue removal is satisfactory and that the pressure in the driving medium for portable fans for ventilation equipment for residue removal can be achieved to give the required fan capacity.

7.5.3.12 confirming that the pumping and stripping systems are satisfactory and that portable pipes or bends in sufficient number, if required, are on board.

7.5.3.13 conducting the water test for assessing the stripping quantity, as required.

7.5.3.14 confirming that the tank washing machines provided on board are in working order, are those described in the Procedures and Arrangements Manual and are installed in accordance with the approved plans.

7.5.3.15 confirming that the wash water heating system, if required, is installed in accordance with the approved plans and is in working order.

7.5.3.16 confirming that the number and position of tank cleaning openings for portable machines are in accordance with the approved plans.

7.5.3.17 confirming that the underwater discharge outlet(s) are in good condition and are in accordance with the approved plans.

7.5.3.18 verifying by actual test that the discharge rate of the pumps, where a variable rate type is used, can be controlled as specified in the Procedures and Arrangements Manual.

7.5.3.19 confirming that the ventilation equipment for residue removal is installed in accordance with the approved plan and is in working order.

7.5.3.20 confirming that the heating system for solidifying and high viscosity substances is installed in accordance with the approved plan and is in working order.

7.5.3.21 confirming that the heating system for solidifying and high viscosity substances is installed in accordance with the approved plan and is in working order.

7.6 Annual Survey-Additional items

7.6.1 Annual Surveys are to be held within 3 months before or after anniversary date from the date of the initial classification survey or of the date credited for the last Special Survey.

7.6.2 The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull and piping are maintained in a satisfactory condition.

7.6.3 Examination of the Hull

7.6.3.1 Examination of the hull plating and its closing appliances as far as can be seen.

7.6.3.2 Examination of watertight penetrations as far as practicable.

7.6.4 Examination of weather decks

7.6.4.1 Examination of cargo tank openings including gaskets, covers, coamings and flame screens.

7.6.4.2 Examination of cargo tanks pressure/vacuum valves and flame screens.

7.6.4.3 Examination of flame screens on vents to all bunker tanks.

7.6.4.4 Examination of cargo, bunker and vent piping systems, including vent masts and headers.

7.6.5 Examination of Cargo pump rooms and pipe tunnels if fitted.

7.6.5.1 Examination of all pump room bulkheads for signs of oil leakage or fractures and, in particular, the sealing arrangements of all penetrations of pump room bulkheads.

7.6.5.2 Examination of the condition of all piping systems.

7.6.6 Examination of Ballast Tanks

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

7.7 Intermediate survey- Additional items

7.7.1 The Intermediate Survey is to be held at or between either the 2nd or 3rd Annual Survey.

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

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

7.7.4 The survey extent is dependent on the age of the vessel as specified in 4.2.2 to 4.2.4.

7.7.5 For weather decks, an examination as far as applicable of cargo, crude oil washing, bunker, ballast, steam and vent piping systems as well as vent masts and headers is to be carried out. If upon examination there is any doubt as to the condition of the piping, the piping may be required to be pressure tested, thickness measured or both.

7.7.6 **Chemical Tankers between 5 – 10 Years of Age**, the following is to apply:

7.7.6.1 For ballast tanks, an Overall Survey of Representative Tanks selected by the Surveyor is to be carried out. If such inspections reveal no visible structural defects, the examination may be limited to a verification that the hard protective coating remains in GOOD condition.

7.7.6.2 A Ballast Tank is to be examined at subsequent annual intervals where:
- a hard protective coating has not been applied from the time of construction, or
- a soft or semi-hard coating has been applied, or
- substantial corrosion is found within the tank, or
- the hard protective coating is found to be in less than GOOD condition and the hard protective coating is not repaired to the satisfaction of the Surveyor.

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

7.7.7 **Chemical Tankers between 10 - 15 years of Age**, the following is to apply:

7.7.7.1 The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 2 and 5.1. However, pressure testing of cargo and ballast tanks is not required unless deemed necessary by the attending Surveyor.

7.7.7.2 In application of 4.2.3.1, the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of 2.1.4.

7.7.7.3 In application of 4.2.3.1, an under water survey may be considered in lieu of the requirements of 2.2.2.

7.7.8 **Oil Tankers over 15 years of Age**, the following is to apply:

7.7.8.1 The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 2 and 5.1. However, pressure testing of cargo and ballast tanks is not required unless deemed necessary by the attending Surveyor.

7.7.8.2 In application of 4.2.4.1, the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of 2.1.4.

7.7.8.3 In application of 4.2.4.1, a survey in dry dock is to be part of the intermediate survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo tanks and water ballast tanks are to be carried out in accordance with the applicable requirements for intermediate surveys, if not already performed.

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

Section 8 – Surveys for Liquified Gas Carriers

8.1 General requirements

8.1.1 The requirements apply to all self-propelled ships carrying liquefied gases in bulk

8.1.2 The requirements apply to surveys of hull structure and cargo installations on ships carrying liquefied gases in bulk.

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

8.2 Thickness measurements and close-up surveys

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

8.3 Extent of Overall and Close-up Survey

8.3.1 An Overall Survey of all tanks and spaces, excluding fuel oil, lube oil and fresh water tanks, is to be carried out at each Special Survey.

8.3.2 The minimum requirements for close-up surveys at special survey are given in Table I.

8.3.3 The Surveyor may extend the close-up survey as deemed necessary taking into account the maintenance of the tanks under survey, the condition of the corrosion prevention system and where tanks have structural arrangements or details which have suffered defects in similar spaces or on similar ships according to available information.

8.3.4 For areas in tanks where hard protective coatings are found to be in a GOOD condition, the extent of close-up surveys according to Table I may be specially considered.

Note: For examination of automatic air pipe heads, reference is to be made to Ch 3/Sec 4.2, Table 4 .

8.4 Renewal Survey-Additional items for hull

8.4.1 The herein requirements are provided in addition to those mentioned in Section 4.

8.4.2 **Tank Protection**. Where provided, the condition of corrosion prevention system of ballast tanks is to be examined. For tanks used for water ballast, excluding double bottom tanks, where a hard protective coating is found in POOR condition and it is not renewed, where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from time of construction, the tanks in question are to be examined at annual intervals. Thickness measurements are to be carried out as deemed necessary by the DBS surveyor. When such breakdown of hard protective coating is found in water ballast double bottom tanks and it is not renewed, where a soft or semi-hard coating has been applied, or where a hard protective coating was not applied from the time of construction, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.

8.4.3 Where the hard protective coating in ballast tanks is found to be in a GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered.

8.4.4 An Overall Survey of all tanks and spaces is to be carried out at each Special Survey. Note: For fuel oil, lube oil and fresh water tanks, reference is to be made to Ch 3/Sec 4.2, Table 3.

8.4.5 The minimum requirements for Close-up Surveys at Special Survey are given in Table I.

8.4.6 The Surveyor may extend the close-up survey as deemed necessary taking into account the maintenance of the tanks under survey, the condition of the corrosion prevention system and where tanks have structural arrangements or details which have suffered defects in similar spaces or on similar ships according to available information

8.4.7 For areas in tanks where hard protective coatings are found to be in a GOOD condition as defined in 1.7.19 of Part 1, Chapter 3, Section 1, the extent of Close-up Surveys according to Table I may be specially considered.

Note: For examination of automatic air pipe heads, reference is to be made to Ch 3/Sec 4.2, Table 4 of this Part.

8.4.8 The minimum requirements for thickness measurements at Special Survey are given in Table II.

8.4.9 The Surveyor may further extend the thickness measurements as deemed necessary. When thickness measurements indicate substantial corrosion, the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table V may be used as guidance for these additional thickness measurements.

8.4.10 For areas in tanks where hard protective coating is found to be in a GOOD condition as defined in 1.7.19 of Part 1, Chapter 3, Section 1, the extent of thickness measurements according to Table II may be specially considered.

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

8.4.12 **Extent of Tank Testing**. All boundaries of water ballast tanks and deep tanks used for water ballast within the cargo area are to be pressure tested. For fuel oil tanks, the representative tanks are to be pressure tested.

8.4.13 The Surveyor may extend the tank testing as deemed necessary.

8.4.14 Tank testing of fuel oil tanks is to be carried out with a head of liquid to the highest point that liquid will rise under service conditions. Tank testing of fuel oil tanks may be specially considered based on a satisfactory external examination of the tank boundaries, and a confirmation from the Master stating that the pressure testing has been carried out according to the requirements with satisfactory results.

Special Survey No. 1 $\boldsymbol{Age \leq 5}$	**Special Survey No. 2** $\boldsymbol{5 < Age \leq 10}$	**Special Survey No. 3 and Subsequent** $\boldsymbol{Age > 10}$
One web frame in a representative ballast tank of the topside, hopper side and double hull side type (1)	All web frames in a ballast tank, which is to be a double hull side tank or a topside tank. If such tanks are not fitted, another ballast tank is to be selected (1)	All web frames in all ballast tanks (1)
One transverse bulkhead in a ballast tank (3)	One web frame in each remaining ballast tank (1)	All transverse bulkheads in all ballast tanks (2)
	One transverse bulkhead in each ballast tank (2)	
(1) Complete transverse web frame including adjacent structural members. (2) Transverse bulkhead complete, including girder system and adjacent members, and adjacent longitudinal bulkhead structure. (3) Transverse bulkhead lower part including girder system and adjacent structural members. Note 1: Ballast tanks include topside, double hull side, double bottom, hopper side, or any combined arrangement of the aforementioned, and peak tanks where fitted. Note 2: For areas in tanks where coatings are found to be in GOOD condition, as defined in 1.2.10, the extent of close-up surveys may be specially considered by the Classification Society. Note 3: For ships having independent tanks of type C, with a midship section similar to that of a general cargo ship, the extent of close-up surveys may be specially considered by the Classification Society. Note 4: The Surveyor may extend the close-up survey as deemed necessary, taking into account the maintenance of the tanks under survey, the condition of the corrosion prevention system and also in the following cases: - in particular, in tanks having structural arrangements or details which have suffered defects in similar tanks, or on similar ships according to available information; - in tanks having structures approved with reduced scantlings.		

Table I: Minimum Requirements to Close-up Surveys at Special Survey at hull Special surveys of Liquefied Gas Carriers

Special Survey No. 1 $Age \leq 5$	**Special Survey No. 2** $5 < Age \leq 10$	**Special Survey No. 3** $10 < Age \leq 15$	**Special Survey No. 4 and Subsequent** $Age > 15$
One section of deck plating for the full beam of the ship within 0.5 L amidships in way of a ballast tank, if any	Within the cargo area: - each deck plate - one transverse section within 0.5 L amidships in way of a ballast tank, if any	Within the cargo area: - each deck plate - two transverse sections (1) - all wind and water strakes	Within the cargo area: - each deck plate -three transverse sections (1) - each bottom plate - duct keel plating and internals
	Selected wind and water strakes outside the cargo area	Selected wind and water strakes outside the cargo area	All wind and water strakes, full length
Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to Close-up Survey according to Table I	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to Close-up Survey according to Table I	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to Close-up Survey according to Table I	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to Close-up Survey according to Table I
Suspect areas	Suspect areas	Suspect areas	Suspect areas
(1) at least one section is to include a ballast tank within 0,5L amidships, if any Note 1: For ships having independent tanks of type C, with a midship section similar to that of a general cargo ship, the extent of thickness measurements may be increased to include the tank top plating at the discretion of the Surveyor. Note 2: For areas in spaces where coatings are found to be in GOOD condition, as defined in 1.2.10, the extent of thickness measurements may be specially considered by the Classification Society. Note 3: The Surveyor may extend the thickness measurements as deemed necessary. Where substantial corrosion, as defined in 1.2.8, is found, the extent of thickness measurements is to be increased to the satisfaction of the Surveyor.			

Table II: Minimum requirements to thickness measurements at Hull special survey of Liquefied Gas Carriers

$10 < Age \leq 15$	$Age > 15$
Close-up survey of: - all web frames and both transverse bulkheads in a representative ballast tank (1) and (2) - the upper part of one web frame in another representative ballast tank - one transverse bulkhead in another representative ballast tank (2)	Close-up survey of: -all web frames and both transverse bulkheads in two representative ballast tanks (1) and (2)
(1) Complete transverse web frame including adjacent structural members (2) Transverse bulkhead complete, including girder system and adjacent members, and adjacent longitudinal bulkhead structure Note 1: Ballast tanks include topside, double hull side, double bottom, hopper side, or any combined arrangement of the aforementioned, and peak tanks where fitted. Note 2: For areas in tanks where protective coating is found to be in GOOD condition, the extent of close-up survey may be specially considered by the Classification Society. Note 3: For ships having independent tanks of type C, with a midship section similar to that of a general cargo ship, the extent of close-up surveys may be specially considered by the Classification Society. Note 4: The extent of close-up surveys may be extended by the Surveyor as deemed necessary, taking into account the maintenance of the tanks under survey, the condition of the corrosion prevention system and also in the following cases: - in particular, in tanks having structural arrangements or details which have suffered defects in similar tanks, or on similar ships according to available information; - in tanks having structures approved with reduced scantlings.	

Table III: Minimum requirements for close-up survey at hull Intermediate surveys of Liquefied Gas Carriers.

STRUCTURAL MEMBER	EXTENT OF MEASUREMENT	PATTERN OF MEASUREMENT
Plating	Suspect area and adjacent plates	5-point pattern over 1 square metre
Stiffeners	Suspect area	3 measurements each in line across web and flange

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

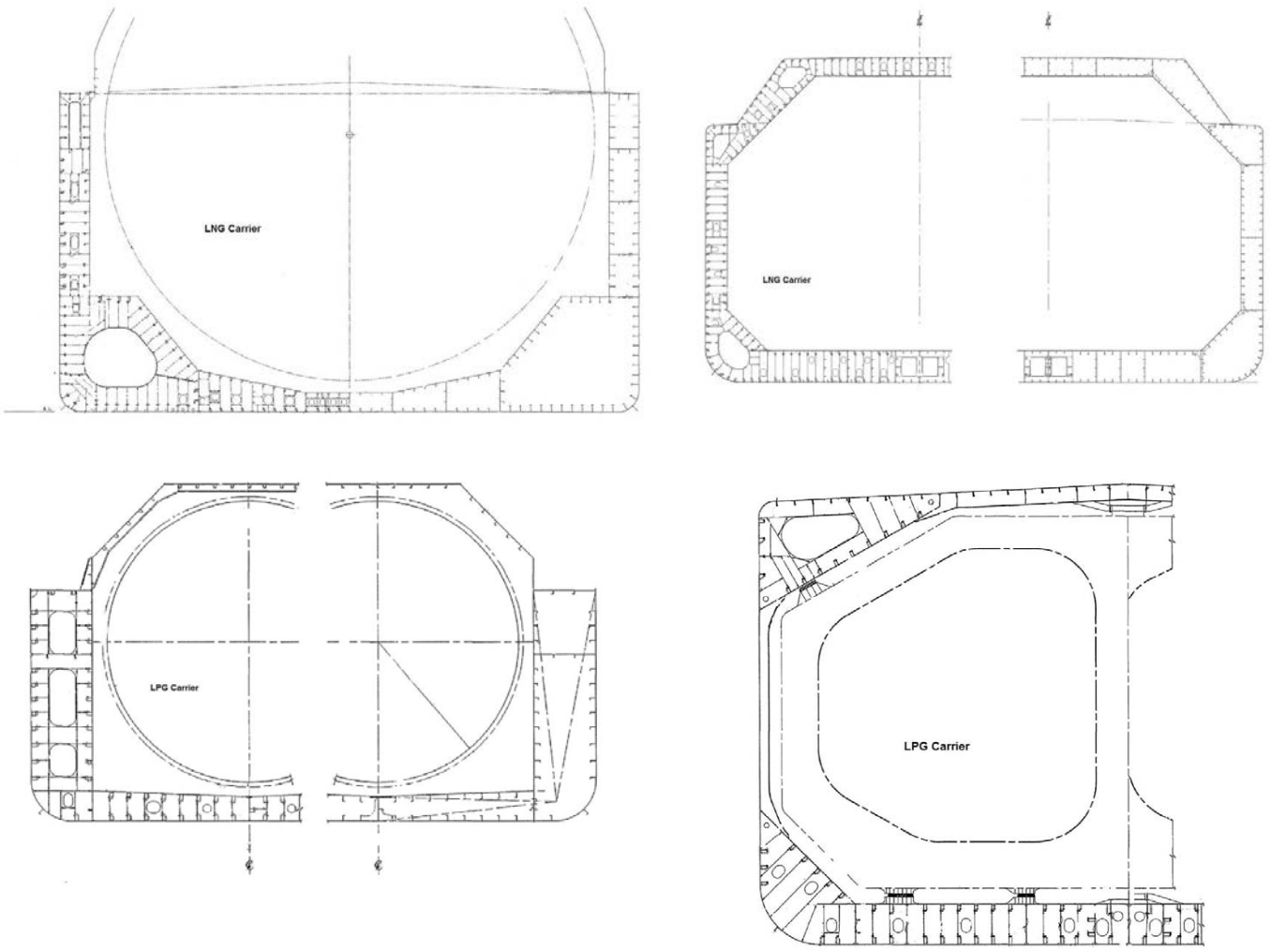


Figure 1 - Typical Midship Sections Of Liquefied Gas Carriers

8.5 Renewal Survey-Additional items for machinery

8.5.1 For the hull, machinery and equipment of cargo ships, concerning the additional requirements for chemical tankers and gas carriers, the renewal survey should consist of the Cargo containment survey:

8.5.1.1 All cargo tanks are to be examined internally.

8.5.1.2 Special attention is to be given to the cargo tank and insulation in way of chocks, supports and keys. Removal of insulation may be required in order to verify the condition of the tank or the insulation itself if found necessary by the DBS Surveyor.

Where the arrangement is such that the insulation 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 the cold condition unless voyage records together with the instrumentation give sufficient evidence of the integrity of the insulation system.

8.5.1.3 Non-destructive testing:

- Non-destructive testing is to supplement cargo tank inspection with special attention to be given to the integrity of the main structural members, tank shell and highly stressed parts, including welded connections as deemed necessary by the surveyor. However, for type C tanks, this does not mean that non-destructive testing can be dispensed with totally. The following items are, inter alia, considered as highly stressed parts:
  - cargo tanks support and anti-rolling/anti-pitching devices,
  - web frames or stiffening rings,
  - swash bulkhead boundaries,
  - dome and stump connections to tank shell,
  - foundations for pumps, towers, ladders, etc.,
  - pipe connections.
- For independent tanks type B, the extent of non-destructive testing shall be as given in a programme specially prepared for the cargo tank design.

8.5.1.4 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.

8.5.1.5 Where findings of Cargo containment survey or an examination of the voyage records raises doubts as to the structural integrity of a cargo tank, a hydraulic or hydro-pneumatic test is to be carried out. For integral tanks and for independent tanks type A and B, the test pressure is to be in accordance with IACS UR G1.10.5 or G1.10.7 as appropriate. For independent tanks type C, the test pressure is not to be less than 1.25 times the MARVS.

8.5.1.6 At every other special survey (i.e., 2nd, 4th, 6th, etc.), all independent cargo tanks type C are to be either:

- Hydraulically or hydro-pneumatically tested to 1.25 times MARVS, followed by nondestructive testing, or
- Subjected to a thorough, planned non-destructive testing. This testing is to be carried out in accordance with a programme specially prepared for the tank design. If a special programme does not exist, the following applies:
  - cargo tank supports and anti-rolling/anti-pitching devices,
  - stiffening rings,
  - Y-connections between tank shell and a longitudinal bulkhead of bilobe tanks,
  - swash bulkhead boundaries,
  - dome and sump connections to the tank shell,
  - foundations for pumps, towers, ladders etc.,
  - pipe connections.

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

Insulation is to be removed as necessary for the required non-destructive testing. (The individual Societies may choose to include any one or both of the above listed two alternatives in their Rules.)

8.5.1.7 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 their effectiveness by means of a pressure/vacuum test, a visual examination or another acceptable method.

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

8.5.1.9 For membrane containment systems a tightness test of the primary and secondary barrier shall be carried out in accordance with the system designers' procedures and acceptance criteria as approved by the classification society. Low differential pressure tests may be used for monitoring the cargo containment system performance, but are not considered an acceptable test for the tightness of the secondary barrier.

8.5.1.10 For membrane containment systems with glued secondary barriers if the designer's threshold values are exceeded, an investigation is to be carried out and additional testing such as thermographic or acoustic emissions testing should be carried out.

8.5.1.11 The pressure/vacuum relief valves, rupture disc and other pressure relief devices for interbarrier spaces and hold spaces are to be opened, examined, tested and readjusted as necessary, depending on their design.

8.5.1.12 The pressure relief valves for the cargo tanks are to be opened for examination, adjusted, function tested, and sealed. If the cargo tanks are equipped with relief valves with non-metallic membranes in the main or pilot valves, such non-metallic membranes are to be replaced. Where a proper record of continuous overhaul and retesting of individually identifiable relief valves is maintained, consideration will be given to acceptance on the basis of opening, internal examination, and testing of a representative sampling of valves, including each size and type of liquefied gas or vapor relief valve in use, provided there is logbook evidence that the remaining valves have been overhauled and tested since crediting of the previous Special Survey.

8.5.1.13 **Piping systems**

- The cargo, liquid nitrogen and process piping systems, including valves, actuators, compensators, etc. are to be opened for examination as deemed necessary. Insulation is to be removed as deemed necessary to ascertain the condition of the pipes. If the visual examination raises doubt as to the integrity of the pipelines, a pressure test at 1.25 times the MARVS for the pipeline is to be carried out. After re-assembly the complete piping systems are to be tested for leaks.
- The pressure relief valves are to be function-tested. A random selection of valves is to be opened for examination and adjusted.

8.5.1.14 **Components**

Cargo pumps, compressors, process pressure vessels, liquid nitrogen tanks, heat exchangers and other components, including prime movers, used in connection with cargo handling and methane boil-off burning are to be examined as required in the Rules of each individual Society for periodical survey of machinery.

8.5.1.15 **Miscellaneous**

- Systems for removal of water or cargo from interbarrier spaces and holds are to be examined and tested as deemed necessary.
- All gas-tight bulkheads are to be inspected. The effectiveness of gas-tight shaft sealing is to be verified.
- The following equipment is to be examined: hoses and spool pieces used for segregation of piping systems for cargo, inert gas and bilging.
- It is to be verified that all cargo piping systems are electrically bonded to the hull.

8.5.2 For the hull, machinery and equipment of cargo ships, **concerning the additional requirements for chemical tankers and gas carriers**, the renewal survey should consist of:

8.5.2.1 confirming, when appropriate, that the requisite arrangements to regain steering capability in the event of the prescribed single failure are being

8.5.2.2 examining the cargo tank openings, including gaskets, covers, coamings and screens;

8.5.2.3 examining the cargo tank pressure/vacuum valves and devices to prevent the passage of flame

8.5.2.4 examining the devices to prevent the passage of flame on vents to all bunker, oily-ballast and oily-slop tanks and void spaces, as far as practicable;

8.5.2.5 examining the cargo tank venting, cargo tank purging and gas-freeing and other ventilation systems

8.5.2.6 examining the cargo, crude oil washing, ballast and stripping systems both on deck and in the cargo pump rooms and the bunker system on deck;

8.5.2.7 confirming that all electrical equipment in dangerous zones is suitable for such locations, is in good condition and is being properly maintained;

8.5.2.8 confirming that potential sources of ignition in or near the cargo pump room are eliminated, such as loose gear, combustible materials, etc., that there are no signs of undue leakage and that access ladders are in good condition;

8.5.2.9 examining all pump room bulkheads for signs of oil leakage or fractures and, in particular, the sealing arrangements of all penetrations of cargo pump room bulkheads;

8.5.2.10 examining, as far as practicable, the cargo, bilge, ballast and stripping pumps for undue gland seal leakage, verification of proper operation of electrical and mechanical remote operating and shutdown devices and operation of cargo pump room bilge system, and checking that pump foundations are intact;

8.5.2.11 confirming that the pump room ventilation system is operational, ducting intact, dampers are operational and screens clean;

8.5.2.12 verifying that installed pressure gauges on cargo discharge lines and level indicator systems are operational;

8.5.2.13 examining access to bow arrangement

8.5.2.14 examining the towing arrangement for tankers of not less than 20,000 tonnes deadweight

8.5.2.15 confirming that the corrosion prevention system fitted to dedicated ballast water tanks of oil tankers and bulk carriers when appropriate is maintained

8.5.2.16 examining the emergency lighting in all cargo pump rooms of tankers constructed after 1 July 2002

8.5.3 For compliance with the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk the renewal survey of the structure, equipment, fittings, arrangements and materials should consist of:

8.5.3.1 examining the insulation and means of support of the cargo tanks and confirming that the secondary barrier remains effective. internal examination of selected cargo tanks.

8.6 Annual Survey-Additional items for hull

8.6.1 Annual Surveys are to be held within 3 months before or after anniversary date from the date of the initial classification survey or of the date credited for the last Special Survey.

8.6.2 The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull and piping are maintained in a satisfactory condition.

8.6.3 Examination of the Hull

8.6.3.1 Examination of the hull plating and its closing appliances as far as can be seen.

8.6.3.2 Examination of watertight penetrations as far as practicable.

8.6.4 Examination of weather decks

8.6.4.1 Examination of flame screens on vents to all bunker tanks.

8.6.4.2 Examination of bunker and vent piping systems.

8.6.5 Examination of cargo pump rooms and compressor rooms and, as far as practicable, pipe tunnels if fitted.

8.6.5.1 Examination of all pump room and compressor room bulkheads for signs of leakage or fractures and, in particular, the sealing arrangements of all penetrations of pump room and compressor room bulkheads.

8.6.5.2 Examination of the condition of all piping systems.

8.6.6 Suspect areas

8.6.6.1 Suspect Areas identified at previous surveys are to be examined. Thickness measurements are to be taken of the areas of substantial corrosion and the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table V may be used as guidance for these additional thickness measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

8.6.7 Examination of Ballast Tanks

8.6.7.1 Examination of Ballast Tanks where required as a consequence of the results of the Renewal Survey and Intermediate Survey is to be carried out. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements are to be increased to determine the extent of areas of substantial corrosion. Table V may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

8.7 Annual Survey -Additional items for machinery

8.7.1 The log books are to be examined with regard to correct functioning of the cargo containment and cargo handling systems. The hours per day of the reliquefuction plants or the boil-off rate is to be considered.

8.7.2 All accessible gas-tight bulkhead penetrations including gas-tight shaft sealings are to be visually examined.

8.7.3 The means for accomplishing gas tightness of the wheelhouse doors and windows is to be examined. All windows and sidescuttles within the area required to be of the fixed type (non-opening) are to be examined for gas tightness. The closing devices for all air intakes and openings into accommodation spaces, service spaces, machinery spaces, control stations and approved openings in superstructures and deckhouses facing the cargo area or bow and stern loading/unloading arrangements, are to be examined.

8.7.4 **Cargo handling systems**

The cargo handling piping and machinery, e.g. cargo and process piping, cargo heat exchangers, vaporizers, pumps, compressors and cargo hoses are in general to be visually examined, as far as possible, during operation.

8.7.5 **Cargo containment venting systems**

Venting systems, including protection screens if provided, for the cargo tanks, interbarrrier spaces and hold spaces are to be visually examined externally. It is to be verified that the cargo tank relief valves are sealed and that the certificate for the relief valves opening/closing pressures is onboard.

8.7.6 **Instrumentation and safety systems**

- The instrumentation of the cargo installations with regard to pressure, temperature and liquid level is to be verified in good working order by one or more of the following methods:
  - Visual external examination;
  - Comparing of read outs from different indicators;
  - Consideration of read outs with regard to the actual cargo and/or actual conditions;
  - Examination of maintenance records with reference to cargo plant instrumentation
  - maintenance manual;
  - Verification of calibration status of the measuring instruments.
- The logbooks are to be examined for confirmation that the emergency shutdown system has been tested.

8.7.7 **Environmental control for cargo containment systems**

- Inert gas/dry air installations including the means for prevention of backflow of cargo vapour to gas-safe spaces are to be verified as being in satisfactory operating condition.
- For membrane containment systems normal operation of the nitrogen control system for insulation and interbarrier spaces shall be confirmed to the Surveyor by the Master.

8.7.8 **Miscellaneous**

- It is to be verified that all accessible cargo piping systems are electrically bonded to the hull.
- Arrangements for burning methane boil-off are to be visually examined as far as practicable. The instrumentation and safety systems are to be verified as being in good working order in accordance with 8.7.6.
- The relevant instruction and information material such as cargo handling plans, filling limit information, cooling down procedures, etc. are to be verified as being onboard.
- Mechanical ventilation fans in gas dangerous spaces and zones are to be visually examined.

8.8 Intermediate survey - Additional items for hull

8.8.1 The Intermediate Survey is to be held at or between either the 2nd or 3rd Annual Survey.

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

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

8.8.4 The scope of the second or third annual survey is to be extended to include the following:

8.8.5 Ballast tanks

8.8.5.1 **For ships between 5 and 10 years of age**, an overall survey of representative ballast tanks is to be carried out. If there is no hard protective coating, soft or semi-hard coating or POOR coating condition, the examination is to be extended to other ballast tanks of the same type.

8.8.5.2 **For ships over 10 years of age**, an overall survey of all ballast tanks is to be carried out.

8.8.5.3 If such examinations reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains efficient.

8.8.5.4 For ballast tanks, excluding double bottom tanks, if there is no hard protective coating, soft or semi-hard coating, or POOR coating condition and it is not renewed, the tanks in question are to be internally examined at annual intervals.

8.8.5.5 When such conditions are found in double bottom ballast tanks, the tanks in question may be internally examined at annual intervals.

8.8.5.6 The minimum requirements for close-up surveys at intermediate survey are given in Table III.

8.9 Intermediate survey- Additional items for machinery

8.9.1 Instrumentation and safety systems

8.9.1.1 The instrumentation of the cargo installation with regard to pressure, temperature and liquid level is to be visually examined and to be tested by changing the pressure, temperature and level as applicable and comparing with test instruments. Simulated testing may be accepted for sensors which are not accessible or for sensors located within cargo tanks or inerted hold spaces. The testing is to include testing of alarm and safety functions.

8.9.1.2 The piping of the gas detection system is to be visually inspected for corrosion and damage as far as practicable. The integrity of the suction lines between suction points and analyzing units is to be verified as far as possible. Gas Detectors are to be calibrated or verified with sample gases.

8.9.1.3 The emergency shutdown system is to be tested, without flow in the pipe lines, to verify that the system will cause the cargo pumps and compressors to stop.

8.9.2 Electrical equipment

8.9.2.1 Electrical equipment in gas-dangerous spaces and zones is to be examined as far as practicable with particular respect to the following:

- Protective earthing (Spot check).
- Integrity of enclosures.
- Damage of outer sheath of cables.
- Function testing of pressurized equipment and of associated alarms.
- Testing of systems for de-energizing non-certified safe electrical equipment located in spaces protected by air-locks, such as electrical motor-rooms, cargo control rooms, etc.
- Testing of insulation resistance of circuits. Such measurements are only to be made when the ship is in a gas-free or inerted condition. Where proper records of testing are maintained consideration may be given to accepting recent readings by the ship's crew.

Note: See also IACS Rec. No.35 - Inspection and maintenance of electrical equipment installed in hazardous areas.

8.9.3 Miscellaneous

8.9.3.1 The instrumentation and safety systems for burning cargo as fuel are to be examined in accordance with the requirements of 8.9.1.1

Section 9 – Surveys for Passenger Ships

9.1 General requirements

9.1.1 Special Surveys are to be carried out at 5 years' intervals to renew the Classification Certificate.

9.1.2 The first Special Survey is to be completed within 5 years from the date of the initial classification survey and thereafter 5 years from the credited date of the previous Special Survey. However, an extension of class of 3 months' maximum beyond the 5th year can be granted in exceptional circumstances.

9.1.3 In this case, the next period of class will start from the expiry date of the Special Survey before the extension was granted.

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

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

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

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

9.1.8 The Special Survey is to include, in addition to the requirements of the Annual Survey, examination, tests and checks of sufficient extent to ensure that the hull, equipment and related piping, as required in 4.1.18, are in satisfactory condition and fit for the intended purpose for the new period of class of five years to be assigned, subject to proper maintenance and operation and the periodical surveys being carried out at the due dates.

9.1.9 The examinations of the hull are to be supplemented by thickness measurements and testing as required in 4.1.17 and 4.1.18, to ensure that the structural integrity remains effective. The aim of the examination is to discover Substantial Corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.

9.1.10 The Special Survey is to include examination of underwater parts per Section 10 of current Chapter 3.

9.1.11 The anchors and chain cables are to be ranged, examined and the required complement and condition verified. The chain locker, holdfasts, hawse pipes and chain stoppers are to be examined and pumping arrangements of the chain locker tested. At Special Survey No.2 and subsequent Special Surveys, chain cables are to gauged and renewed in cases where their mean diameter is worn below the limits allowed by the Society.

9.1.12 All spaces including holds and their 'tween decks where fitted; double bottom, deep, ballast, peak and cargo tanks; pumprooms, pipe tunnels, duct keels, machinery spaces, dry spaces, cofferdams and voids are to be internally examined including the plating and framing, bilges and drain wells, sounding, venting, pumping and drainage arrangements. Internal examination of fuel oil, lube oil and fresh water tanks is to be carried out in accordance with Table 3.

9.1.13 Engine room structure is to be examined. Particular attention is to be given to tank tops, shell plating in way of tank tops, brackets connecting side shell frames and tank tops, and engine room bulkheads in way of tank top and bilge wells. Particular attention is to be given to the sea suctions, sea water cooling pipes and overboard discharge valves and their connections to the shell plating. Where wastage is evident or suspect, thickness measurements are to be carried out, and renewals or repairs made when wastage exceeds allowable limits.

9.1.14 Where provided, the condition of corrosion prevention system of ballast tanks is to be examined. For ballast tanks, excluding double bottom tanks, where a hard protective coating is found in POOR condition and it is not renewed, where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from time of construction, the tanks in question are to be examined at annual intervals. Thickness measurements are to be carried out as deemed necessary by the surveyor.

9.1.15 When such breakdown of hard protective coating is found in double bottom ballast tanks and it is not renewed, where a soft or semi-hard coating has been applied, or where a hard protective coating was not applied from the time of construction, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.

9.1.16 Boundaries of double-bottom, deep, ballast, peak, and other tanks, including holds adapted for the carriage of salt water ballast, are to be tested with a head of liquid to the top of air pipes or to near the top of hatches for ballast/cargo holds. Boundaries of fuel oil, lube oil and fresh water tanks are to be tested with a head of liquid to the highest point that liquid will rise under service conditions. Tank testing of fuel oil, lube oil and fresh water tanks may be specially considered based on a satisfactory external examination of the tank boundaries, and a confirmation from the Master stating that the pressure testing has been carried out according to the requirements with satisfactory results. The Surveyor may extend the testing as deemed necessary.

9.1.17 Hatch Covers and Coamings The hatch covers and coamings are to be surveyed as follows:

9.1.17.1 A thorough inspection of weather decks, ship side plating above water line, hatch covers and coamings, including close-up survey of hatch cover plating and hatch coaming plating, is to be carried out. Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey shall be done of accessible parts of hatch covers structures.

9.1.17.2 Checking of the satisfactory operation of all mechanically operated hatch covers is to be made, including:

- stowage and securing in open condition;
- proper fit and efficiency of sealing in closed conditions;
- operational testing of hydraulic and power components, wires, chains and link drives.

9.1.17.3 Checking the effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent is to be carried out.

9.1.18 Thickness measurements are to be carried out in accordance with Ch 3/ Sec 4/Table 1 of this Part. The Surveyor may extend the thickness measurements as deemed necessary. When thickness measurements indicate substantial corrosion, the extent of thickness measurements is to be increased to determine areas of substantial corrosion.Ch 3/ Sec 4/Table 2 of this Part may be used as guidance for these additional thickness measurements. These extended thickness measurements are to be carried out before the survey is credited as completed.

9.1.19 All bilge and ballast piping systems are to be examined and operationally tested to working pressure to attending Surveyor's satisfaction to ensure that tightness and condition remain satisfactory.

9.1.20 For all ships except for passenger ships, automatic air pipe heads are to be completely examined (both externally and internally) as indicated in Ch 3/ Sec 4/Table 4 of this Part. For designs where the inner parts cannot be properly inspected from outside, this is to include removal of the head from the air pipe. Particular attention is to be paid to the condition of the zinc coating in heads constructed from galvanised steel.

9.2 Requirements for Surveys for the Passenger Ship Certificate

9.2.1 For the hull, machinery and equipment of passenger ships the completion of the renewal survey issuing the Passenger Ship Safety Certificate and its associated Record of Equipment.

9.2.2 For the hull, machinery and equipment of passenger ships the examination of current certificates and other records should consist of:

9.2.2.1 checking the validity of the International Load Line Certificate or International Load Line Exemption Certificate;

9.2.2.2 checking the validity of the Safety Management Certificate (SMC) and that a copy of the Document of Compliance (DOC) is on board;

9.2.2.3 checking the validity of the International Ship Security Certificate;

9.2.2.4 checking the validity of the International Oil Pollution Prevention Certificate;

9.2.2.5 checking the certificates of class, if the ship is classed with a classification society;

9.2.2.6 checking, when appropriate, the validity of the International Pollution Prevention Certificate for the Carriage of Noxious Liquid Substances in Bulk;

9.2.2.7 checking, when appropriate, the validity of the International Sewage Pollution Prevention Certificate;

9.2.2.8 checking, when appropriate, the validity of the International Air Pollution Prevention Certificate;

9.2.2.9 confirming, when appropriate, the validity of the International Energy Efficiency Certificate (MARPOL Annex VI, regs.6.4 and 6.5);

9.2.2.10 checking that the ship's complement complies with the Minimum Safe Manning Document (SOLAS 74/00/12 reg.V/14) (SOLAS 74/88 reg.V/13(b));

9.2.2.11 checking that the master, officers and ratings are certificated as required by the STCW Convention;

9.2.2.12 checking, where applicable, that the noise survey report as required by the Code on noise levels on board ships is available on board (SOLAS 74/12 reg. II-1/3-12);

9.2.2.13 confirming that, where applicable, the approved documentation for the alternative design and arrangements is on board (SOLAS 74/00/06 regs.II-1/55, II-2/17 and III/38);

9.2.2.14 checking whether any new equipment has been fitted and, if so, confirming that it has been approved before installation and that any changes are reflected in the appropriate certificate;

9.2.2.15 checking that the routine surveys of the boilers and other pressure vessels, as determined by the Administration, have been carried out as required and that safety devices, such as the boiler safety valves, have been tested;

9.2.2.16 checking that, as appropriate, the hull and machinery has been presented for survey in accordance with the continuous survey scheme approved by the Administration or a classification society;

9.2.2.17 confirming that the opening and the closing and locking of side scuttles positioned below the margin line or the bulkhead deck, as applicable, are being recorded in the log-book (SOLAS 74/88 reg.II-1/17), (SOLAS 74/06 reg.II-1/15);

9.2.2.18 confirming that the closure of the cargo loading doors and the opening and closing of any doors at sea required for the operation of the ship or the embarking and disembarking of passengers are being recorded in the log-book (SOLAS 74/88 reg.II-1/20-1) (SOLAS 74/06 reg.II-1/22);

9.2.2.19 confirming that the stability information and damage control plans and damage control booklets are readily available (SOLAS 74/88 regs.II-1/22 and 23) (SOLAS 74/06 regs.II-1/5-1 and 19);

9.2.2.20 confirming from the log-book entries that the openings required to be closed at sea are being kept closed and that the required drills and inspections of watertight doors, etc., are being carried out (SOLAS 74/88 regs.II-1/24 and 25) (SOLAS 74/06 regs.II-1/21 and 22);

9.2.2.21 confirming that documented operating procedures for closing and securing the openings in special category spaces and ro-ro spaces are available on board (SOLAS 74/06 reg.II-1/23);

9.2.2.22 confirming that the manoeuvring booklet is readily available and that the manoeuvring information is displayed on the navigating bridge (SOLAS 74/88 reg.II-1/28);

9.2.2.23 confirming that the fire control plans are permanently exhibited or, alternatively, that emergency booklets have been provided and a duplicate of the plans or the emergency booklet is available in a prominently marked enclosure external to the ship's deckhouse (SOLAS 74/88 reg.II-2/20);

9.2.2.24 confirming that the maintenance plans have been provided (SOLAS 74/00 regs.II-2/14.2.2 and 14.3);

9.2.2.25 confirming that the training manuals and the fire safety operational booklets have been provided (SOLAS 74/00 regs.II-2/15.2.3 and 16.2);

9.2.2.26 checking whether any fire has occurred on board necessitating the operation of the fixed fire-extinguishing systems or the portable fire extinguishers since the last survey and the entries into the ship's log-book;

9.2.2.27 checking, when appropriate, that the ship is provided with a document indicating compliance with the special requirements for carrying dangerous goods (SOLAS 74/00/08 reg.II-2/19.4) (SOLAS 74/88 reg.II-2/54.3);

9.2.2.28 confirming that ship-specific plans and procedures for recovery of persons from the water have been provided (SOLAS 74/12 reg. III/17-1);

9.2.2.29 confirming, when appropriate, that there is a special list, manifest or stowage plan for the carriage of dangerous goods (SOLAS 74/88 reg.VII/5);

9.2.2.30 confirming that emergency instructions are available for each person on board, that the muster list is posted in conspicuous places, and that they are in a language understood by the persons on board (SOLAS 74/00 regs.III/8 and 37);

9.2.2.31 confirming that, if applicable, a factual statement issued by the manufacturer of the lifeboat release mechanism is available, confirming the successful overhaul examination of a mechanism compliant with paragraphs 4.4.7.6.4 to 4.4.7.6.6 of the LSA Code, or, alternatively, that a statement of acceptance of the installation of a replacement release and retrieval system to an existing lifeboat is available (SOLAS 74/11 reg.III/1.5; LSA Code section 4.4.7.6);

9.2.2.32 checking that log-book entries are being made (SOLAS 74/00/13 regs.III/19 and 20), in particular:
- the date when the last full muster of the passengers and crew for boat and fire drill took place, and the date when the last enclosed space entry and rescue drills took place;
- the records indicating that on voyages where passengers are scheduled to be on board for more than 24 h, musters of newly-embarked passengers have taken place prior to or immediately upon departure;
- the records indicating that the lifeboat equipment was examined at that time and found to be complete;
- the last occasion when the lifeboats were swung out and when each one was lowered into the water;
- the records indicating that crew members have received the appropriate onboard training;

9.2.2.33 confirming that the training manual and training aids for the life-saving appliances are available on board in the working language of the ship (SOLAS 74/00/04 reg.III/35);

9.2.2.34 confirming that the instructions for on board maintenance of the life-saving appliances is on board (SOLAS 74/00 reg.III/36);

9.2.2.35 checking by the log-book entries that the testing and the emergency drills of the steering gear have been carried out (SOLAS 74/00 reg.V/26);

9.2.2.36 confirming that a table or curve of residual deviations for the magnetic compass is available and that a diagram of the radar installations shadow sectors is displayed (SOLAS 74/00 reg.V/19);

9.2.2.37 checking that operational and, where appropriate, maintenance manuals for all navigational equipment are provided (SOLAS 74/00 reg.V/16);

9.2.2.38 checking that the charts and nautical publications necessary for the intended voyage are available and have been updated (SOLAS 74/00 reg.V/27);

9.2.2.39 checking that the compass deviation book is properly maintained (SOLAS 74/00 reg.V/19);

9.2.2.40 checking that records are maintained identifying any pilot ladders placed into service and any repair effected (SOLAS 74/10 reg. V/23.2.4);

9.2.2.41 confirming that a list showing the operational limitations imposed on the ship is kept on board (SOLAS 74/00 reg.V/30);

9.2.2.42 checking the life-saving signals to be used by ships, aircraft or persons in distress (SOLAS 74/00 reg.V/29);

9.2.2.43 confirming the provisions of (PI) 5.1.3.16 to (PI) 5.1.3.22 except (PI) 5.1.3.19;

9.2.2.44 confirming that a record has been kept in the period since the last survey to the satisfaction of the Administration and as required by the Radio Regulations (SOLAS 74/88 reg.IV/17);

9.2.2.45 checking documentary evidence that the actual capacity of the battery has been proved in port within the last 12 months (SOLAS 74/88 reg.IV/13);

9.2.2.46 if applicable, checking that a list of all limitations on the operation of a passenger ship is kept on board and updated;

9.2.2.47 confirming that continuous synopsis record is provided (SOLAS 74/02 reg.XI-1/5);

9.2.2.48 checking that the annual test has been carried out for the Satellite EPIRB and, if applicable, that shore-based maintenance has been carried out at intervals not exceeding five years (SOLAS 74/04 reg.IV/15);

9.2.2.49 checking that arrangements are provided to maintain records of navigational activities and daily reporting (SOLAS 74/00/03 reg.V/28);

9.2.2.50 confirming the availability of the International Anti-Fouling System Certificate (AFS 2001 annex 4 reg.2), when applicable.

9.2.3 For the hull, machinery and equipment of passenger ships the renewal survey should consist of:

9.2.3.1 examining the outside of the ship's bottom, including the bottom and bow plating, keel, bilge keels, stem, stern frame, the rudder, sea chests and strainers, noting the clearance measured in the rudder bearings, examining the propeller and shaft seals, as far as practicable, and noting the clearance measured in the propeller shafts (SOLAS 74/88 reg.I/7(b)(ii));

9.2.3.2 examining the arrangements for subdivision, including the ship's stability in the damaged condition, and checking the subdivision load lines (SOLAS 74/88 regs.II-1/4 to 8, 13 and 16) (SOLAS 74/06/12 regs.II-1/8, 8-1, 14 and 18);

9.2.3.3 confirming the provision of operational information to the master for safe return to port after a flooding casualty by on board stability computer or shore-based support (SOLAS 74/12 reg. II-1/8-1);

9.2.3.4 checking the ballasting arrangements (SOLAS 74/88 reg.II-1/9) (SOLAS 74/06 reg.II-1/20);

9.2.3.5 confirming that dedicated sea water ballast tanks have been coated in accordance with resolution MSC.215(82) when appropriate (SOLAS 74/00/06 reg.II-1/3-2);

9.2.3.6 confirming when appropriate that the maintenance of the protective coating is included in the overall ship's maintenance system (SOLAS 74/00/06 reg.II-1/3-2);

9.2.3.7 examining the collision and other watertight bulkheads required for the ship's subdivision (SOLAS 74/88 regs.II-1/10, 14, 15 and 18) (SOLAS 74/06, regs.II-1/10, 11, 12, 13 and 16);

9.2.3.8 confirming that the watertight integrity has been maintained where pipes, scuppers, etc., pass through subdivision watertight bulkheads (SOLAS 74/88 reg.II-1/15) (SOLAS 74/06 reg.II-1/13);

9.2.3.9 confirming that a diagram is provided on the navigating bridge showing the location of the watertight doors together with indicators showing whether the doors are open or closed (SOLAS 74/88 reg.II-1/15) (SOLAS 74/06 reg.II-1/13);

9.2.3.10 testing the operation of the watertight doors both from the navigating bridge in the event of an emergency and locally at the door itself (SOLAS 74/88 reg.II-1/15) (SOLAS 74/06 reg.II-1/13) and, in particular, that they are:

- operable locally from each side of the bulkhead;
- provided with devices giving an indication of whether the door is open or closed at all remote operating positions;
- provided with an audible alarm that is distinct from any other alarm in the area and, when appropriate, an intermittent visual signal;
- provided with control handles on each side of the bulkhead so that a person may hold both handles in the open position and pass safely through the watertight door without accidentally setting the power closing mechanism into operation;

9.2.3.11 confirming that the watertight doors and their indicating devices are operable in the event of a failure of the main and emergency sources of power (SOLAS 74/88 reg.II-1/15) (SOLAS 74/06 reg.II-1/13);

9.2.3.14 checking, when appropriate, any watertight doors that are not required to be closed remotely, fitted in watertight bulkheads dividing 'tween deck spaces, and confirming that a notice is affixed concerning their closure (SOLAS 74/88 reg.II-1/15) (SOLAS 74/06 reg.II-1/13);

9.2.3.15 confirming that a notice is affixed to any portable plates on bulkheads in machinery spaces concerning their closure and, if appropriate, testing any power-operated watertight door fitted in lieu (SOLAS 74/88 reg.II-1/15) (SOLAS 74/06 reg.II-1/13);

9.2.3.16 examining the arrangements for closing side scuttles and their deadlights, also scuppers, sanitary discharges and similar openings and other inlets and discharges in the shell plating below the margin line (SOLAS 74/88 reg.II-1/17);

9.2.3.17 examining the arrangements for closing side scuttles and their deadlights, also scuppers, sanitary discharges and similar openings and other inlets and discharges in the shell plating below the bulkhead deck (SOLAS 74/06 reg.II-1/15);

9.2.3.18 confirming that valves for closing the main and auxiliary sea inlets and discharges in the machinery spaces are readily accessible and indicators showing the status of the valves are provided (SOLAS 74/88 reg.II-1/17) (SOLAS 74/06 reg.II-1/15);

9.2.3.19 confirming that gangway, cargo and coaling ports fitted below the margin line may be effectively closed and that the inboard ends of any ash or rubbish chutes are fitted with an effective cover (SOLAS 74/88 reg.II-1/17);

9.2.3.20 confirming that gangway, cargo and fuelling ports fitted below the bulkhead deck may be effectively closed and that the inboard ends of any ash or rubbish chutes are fitted with an effective cover (SOLAS 74/06 reg.II-1/15);

9.2.3.21 examining the arrangements to maintain the watertight integrity above the margin line or the bulkhead deck as applicable (SOLAS 74/88 reg.II-1/20) (SOLAS 74/06 reg.II-1/17);

9.2.3.22 examining the arrangements for the bilge pumping and confirming that each bilge pump and the bilge pumping system provided for each watertight compartment is working efficiently (SOLAS 74/88 reg.II-1/21) (SOLAS 74/05 reg.II-1/35-1);

9.2.3.23 confirming that the drainage system of enclosed cargo spaces situated on the freeboard deck is working efficiently (SOLAS 74/88 reg.II-1/21) (SOLAS 74/05 reg.II-1/35-1);

9.2.3.34 examining visually the drainage facilities for blockage or other damage and confirming the provision of means to prevent blockage of drainage arrangements, for closed vehicle and ro-ro spaces and special category spaces where fixed pressure water-spraying systems are used (SOLAS 74/08 reg.II-2/20.6.1.5);

9.2.3.35 examining, when appropriate, the means of indicating the status of any bow doors and any leakage there from (SOLAS 74/88 reg.II-1/23-2);

9.2.3.36 confirming, that the arrangement for monitoring special category spaces or ro-ro spaces, when fitted, is satisfactory (SOLAS 74/06 reg.II-1/23);

9.2.3.37 confirming that the machinery, boilers and other pressure vessels, associated piping systems and fittings are being maintained so as to reduce to a minimum any danger to persons on board, due regard being given to moving parts, hot surfaces and other hazards (SOLAS 74/88 reg.II-1/26);

9.2.3.38 confirming that normal operation of the propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative (SOLAS 74/88 reg.II-1/26);

9.2.3.39 confirming that means are provided so that the machinery can be brought into operation from the dead ship condition without external aid (SOLAS 74/88 reg.II-1/26);

9.2.3.40 examining, where practicable, the means provided to protect against overpressure in the parts of main, auxiliary and other machinery that is subject to internal pressure and may be subject to dangerous overpressure (SOLAS 74/88 reg.II-1/27);

9.2.3.41 examining, when appropriate, the crankcase explosion relief devices fitted to internal combustion engines and confirming that they are arranged so as to minimize the possibility of injury to personnel (SOLAS 74/88 reg.II-1/27);

9.2.3.42 confirming that the automatic shut-off arrangements fitted to the main turbine propulsion machinery and, where applicable, main internal combustion propulsion machinery and auxiliary machinery are being properly maintained (SOLAS 74/88 reg.II-1/27);

9.2.3.43 confirming, as far as practicable, the ability of the machinery to reverse the direction of the thrust of the propeller in sufficient time, including the effectiveness of any supplementary means of manoeuvring or stopping the ship (SOLAS 74/88 reg.II-1/28);

9.2.3.44 confirming that the main and auxiliary steering gear are being properly maintained, are arranged so that the failure of one does not render the other inoperative and that the auxiliary steering gear is capable of being brought speedily into action in an emergency* (SOLAS 74/88 reg. II-1/29);

9.2.3.45 confirming that, where appropriate, essential components of the steering gear are permanently lubricated or provided with lubrication fittings (SOLAS 74/88 reg.II-1/29);

9.2.3.46 confirming that relief valves fitted to the steering gear hydraulic system which can be isolated, and in which pressure can be generated from the power source or from external forces, are being maintained and are set to a pressure not exceeding the design pressure (SOLAS 74/88 reg.II-1/29);

9.2.3.47 confirming that the main or auxiliary steering gear power units restart automatically when power is restored after a power failure, that they are capable of being brought into operation from a position on the navigating bridge and that, in the event of a power failure to any one of the steering gear power units, an audible and visual alarm is given on the navigating bridge (SOLAS 74/88 reg.II-1/29);

9.2.3.48 confirming that the control systems for the main steering gear from both the navigating bridge and the steering gear compartment are operating satisfactorily (SOLAS 74/88 reg.II-1/29);

9.2.3.49 confirming that, where the main steering gear comprises two or more identical power units and an auxiliary steering gear is not fitted, the two independent control systems from the navigating bridge are operating satisfactorily (SOLAS 74/88 reg.II-1/29);

9.2.3.50 confirming that the control system for the auxiliary steering gear, in the steering gear compartment and, if this gear is power-operated, from the navigating bridge, are operating satisfactorily and that the latter is independent of the control system for the main steering gear (SOLAS 74/88 reg.II-1/29);

9.2.3.51 confirming that an audible and visual alarm is given on the navigating bridge in the event of a failure of electrical power supply (SOLAS 74/88 reg.II-1/29);

9.2.3.52 confirming that the means of communication between the bridge and the steering gear is operating satisfactorily and that, with ships having emergency steering positions, a telephone or other means of communication for relaying heading information and supplying visual compass readings to the emergency steering position is provided (SOLAS 74/00 regs.II-1/29 and V/19);

9.2.3.53 confirming that the angular position of the rudder is indicated independently of the steering control system on the navigating bridge if the main steering gear is power-operated and that this angular position

9.2.3.54 is given in the steering gear compartment (SOLAS 74/00 reg.II-1/29 and reg.V/19);

9.2.3.55 confirming that with a hydraulic power-operated steering gear the audible and visual low-level alarms on the navigating bridge and in the machinery space for each hydraulic fluid reservoir are operating satisfactorily and that at least one power-actuating system including the reservoir can be recharged from a position within the steering gear compartment by means of a fixed storage tank to which a contents gauge is fitted with fixed piping (SOLAS 74/88 reg.II-1/29);

9.2.3.56 confirming that the steering gear compartment is readily accessible and is provided with suitable arrangements to ensure working access to steering gear machinery and controls under safe conditions (SOLAS 74/88 reg.II-1/29);

9.2.3.57 confirming that, with electric and electro-hydraulic steering gear, the means for indicating on the navigating bridge and at a main machinery control position that the motors are running and, as far as practicable, that the overload alarm and alarm for the loss of a phase in a three phase supply located at the main machinery control position are operating satisfactorily (SOLAS 74/88 reg.II-1/30);

9.2.3.58 confirming that the effective means of operation and control of the main and auxiliary machinery essential for the propulsion and the safety of the ship are being maintained, including, when appropriate, any means for remotely controlling the propulsion machinery from the navigating bridge (including the control, monitoring, reporting, alert and safety actions) (SOLAS 74/88/00/02 reg.II-1/31);

9.2.3.59 confirming that arrangements to operate main and other machinery from a machinery control room are satisfactory (SOLAS 74/88 reg.II-1/31);

9.2.3.60 confirming that the means provided for manually overriding automatic controls are being maintained and that a failure does not prevent the use of the manual override (SOLAS 74/88 reg.II-1/31);

9.2.3.61 confirming that the appropriate safety features fitted to the oil-fired and exhaust gas boilers, unfired steam generators, steam pipe systems and air pressure systems are being maintained (SOLAS 74/88 regs.II-I/32, 33 and 34);

9.2.3.62 confirming the operation of the ventilation for the machinery spaces (SOLAS 74/88 reg.II-I/35);

9.2.3.63 when appropriate, confirming that the measures to prevent noise in machinery spaces are effective (SOLAS 74/88 reg. II-I/36 and SOLAS 74/12 reg.II-1/3-12.2); or confirming that the ship was constructed to reduce on board noise and to protect personnel from noise in accordance with the Code on noise levels on board ships, adopted by resolution MSC.337(91), as amended (SOLAS 74/12 reg.II-1/3-12);

9.2.3.64 confirming that the engine room telegraph giving visual indication of the orders and answers both in the machinery space and on the navigation bridge is operating satisfactorily (SOLAS 74/88 reg.II-1/37);

9.2.3.65 confirming that the second means of communication between the navigation bridge and machinery space is also operating satisfactorily, including any appropriate means provided to any other positions from which the engines are controlled (SOLAS 74/88 reg.II-1/37);

9.2.3.66 confirming that the engineer's alarm is clearly audible in the engineers' accommodation (SOLAS 74/88 reg.II-1/38);

9.2.3.67 confirming that precautions taken to prevent any oil that may escape under pressure from any pump, filter or heater from coming into contact with heated surfaces, are efficient;

9.2.3.68 confirming that the means of ascertaining the amount of oil contained in any oil tank are in satisfactory working condition (SOLAS 74/88 reg.II-2/15) (SOLAS 74/02 reg.II-2/33);

9.2.3.69 confirming that the devices provided to prevent overpressure in any oil tank or in any part of the oil system, including the filling pipes, are in satisfactory working condition (SOLAS 74/88 reg.II-2/15) (SOLAS 74/02 reg.II-2/33);

9.2.3.70 confirming that the electrical installations, including the main source of power and lighting systems, are being maintained (SOLAS 74/88 regs.II-1/40 and 41);

9.2.3.71 confirming that the self-contained emergency source of electrical power and its associated systems are operating satisfactorily (SOLAS 74/88 reg.II-1/42);

9.2.3.72 confirming that the starting arrangements of each emergency generating set are satisfactory (SOLAS 74/88 reg.II-1/44);

9.2.3.73 checking, when appropriate, the disposition of and testing the supplementary emergency lighting (SOLAS 74/88 reg.II-1/42-1);

9.2.3.74 for passenger ships constructed on or after 1 July 2010, checking the provision of supplementary lighting in all cabins, and checking that such lighting automatically illuminates and remains on for a minimum of 30 min when power to the normal cabin lighting is lost (SOLAS 74/06 reg.II-1/41.6);

9.2.3.75 confirming that precautions provided against shock, fire and other hazards of electrical origin are being maintained (SOLAS 74/88 reg.II-1/45);

9.2.3.76 confirming, when appropriate, that the arrangements for the machinery spaces being periodically unattended are satisfactory (SOLAS 74/88 reg.II-1/54);

9.2.3.77 examining, where applicable, the alternative design and arrangements for machinery or electrical installations, fire safety, or life-saving appliances and arrangements, in accordance with the test, inspection and maintenance requirements, if any, specified in the approved documentation (SOLAS 74/00/06 regs.II-1/55, II-2/17 and III/38);

9.2.3.78 examining the fire pumps and fire main and the disposition of the hydrants, hoses and nozzles and the international shore connection and checking that each fire pump, including the emergency fire pump, can be operated separately so that two jets of water are produced simultaneously from different hydrants at any part of the ship whilst the required pressure is maintained in the fire main (SOLAS 74/00 reg.II-2/10.2; FSS Code chs.2 and 12) (SOLAS 74/88 regs.II-2/4 and 19);

9.2.3.79 examining the provision and randomly examining the condition of the portable and non-portable fire extinguishers (SOLAS 74/00 reg.II-2/10.3; FSS Code ch.4) (SOLAS 74/88 reg.II-2/6);

9.2.3.80 examining the fixed fire extinguishing system for machinery, cargo, special category and vehicle spaces and confirming that its means of operation are clearly marked (SOLAS 74/00/12 regs.II-2/10.4, 10.5, 10.7 and 20.6.1; FSS Code chs.5 to 7) (SOLAS 74/88 regs.II-2/5, 7, 9, 10 and 53);

9.2.3.81 examining the special arrangements in the machinery spaces and confirming, as far as practicable and as appropriate, the operation of the remote means of control provided for the opening and closing of the skylights, the release of smoke, the closure of the funnel and ventilation openings, the closure of power-operated and other doors, the stopping of ventilation and boiler forced and induced draft fans and the stopping of oil fuel and other pumps that discharge flammable liquids (SOLAS 74/00 regs.II-2/5.2, 8.3 and 9.5) (SOLAS 74/88 reg.II-2/11);

9.2.3.82 checking that fixed carbon dioxide fire-extinguishing systems for the protection of machinery spaces, where applicable, are provided with two separate controls, one for opening of the gas piping and one for discharging the gas from the storage container, each of them located in a release box clearly identified for the particular space (SOLAS 74/08 reg.II-2/10.4, FSS Code ch.5.2.2.2);

9.2.3.83 examining the fire-extinguishing arrangements in control stations, accommodation and service spaces (SOLAS 74/00 reg.II-2/10.6.1; FSS Code ch.8) (SOLAS 74/88 reg.II-2/36);

9.2.3.84 examining, when applicable, the fire-extinguishing arrangements in cabin balconies (SOLAS 74/00 reg.II-2/10.6.1);

9.2.3.85 examining the provision of fire-extinguishing systems for the spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces (SOLAS 74/00 regs.II-2/10.6.3 and 10.6.4; FSS Code chs.5, 6 and 7) (SOLAS 74/88 reg.II-2/15.2.5));

9.2.3.86 examining the arrangements for oil fuel, lubricating oil and other flammable oils and confirming, as far as practicable and as appropriate, the operation of the remote means of closing the valves on the tanks that contain oil fuel, lubricating oil and other flammable oils (SOLAS 74/00 reg.II-2/4.2) (SOLAS 74/88 reg.II-2/15);

9.2.3.87 examining and testing, as far as practicable, any fire detection and fire alarm arrangements in machinery spaces, including enclosed spaces containing incinerators, if applicable, accommodation and service spaces and control spaces (SOLAS 74/00/10 reg. II-2/7 (except 7.5.5, 7.6 and 7.9); FSS Code chs.8 and 9) (SOLAS 74/88 regs.II-2/11, 12, 13, 13-1, 14, 36 and 41);

- examining and testing, where applicable, any fire detection and fire alarm arrangements on cabin balconies. (SOLAS 74/00 reg.II-2/7.10);
- for passenger ships constructed on or after 1 July 2010, confirming the smoke detectors in cabins, when activated, are emitting, or cause to emit, an audible alarm within the space where they are located (SOLAS 74/06 regs.II-2/7.5.2 and 7.5.3.1);
- for passenger ships constructed on or after 1 July 2010, confirming detectors and manually operated call points of a fixed fire detection and fire alarm system can be remotely and individually identified (SOLAS 74/06 reg.II-2/7.2.4);

9.2.3.88 confirming that the firefighters' outfits including their self-contained compressed air breathing apparatus, and the emergency escape breathing devices (EEBDs) are complete and in good condition and that the cylinders, including the spare cylinders, of the self-contained breathing apparatus, are suitably charged, and that onboard means of recharging breathing apparatus cylinders used during drills or a suitable number of spare cylinders to replace those used are provided, and provision of two-way portable radiotelephone apparatus of an explosion-proof type or intrinsically safe. (SOLAS 74/00/12 regs.II-2/10.10, 13.3.4, 13.4.3 and 15.2.2; FSS Code ch.3) (SOLAS 74/88 reg.II-2/17);

9.2.3.89 checking the operational readiness and maintenance of firefighting systems (SOLAS 74/00 reg.II-2/14) (SOLAS 74/88/91 reg.II- 2/21);

9.2.3.90 confirming, as far as practicable, that no changes have been made in the structural fire protection, including the structure, fire integrity, protection of stairways and lifts, cabin balconies, openings in "A" and "B" Class divisions, ventilation systems and windows and side scuttles, and the use of combustible material (SOLAS 74/00/04/12 regs.II-2/5.2, 5.3, 6, 8.2, 8.5, 9.2.1, 9.2.2, 9.3, 9.4.1, 9.5, 9.6 (except 9.6.3), 9.7 and 11 (except 11.6)) (SOLAS 74/88 regs.II-2/11, 16, 18, 23 to 35 and 37);

9.2.3.91 confirming, as far as practicable, that no changes have been made in the structural fire protection in cargo spaces intended for the carriage of dangerous goods (SOLAS 74/00 regs.II-2/19.3.8 and 19.3.10) (SOLAS 74/88 regs.II-2/4, 54.2.8, 54.2.10 and 54.2.11);

9.2.3.92 examining and testing any manual and automatic fire doors including the means of closing the openings in "A" and "B" Class divisions (SOLAS 74/00 reg.II-2/9.4.1) (SOLAS 74/88 regs.II-2/30 and 31);

9.2.3.93 examining and testing the main inlets and outlets of all ventilation systems and checking that the power ventilation is capable of being stopped from outside the space served (SOLAS 74/00 reg.II-2/5.2.1) (SOLAS 74/88 regs.II-2/16 and 32);

9.2.3.94 confirming that the stairways and ladders, including the low-location lighting system, arranged to provide a means of escape to the lifeboat and liferaft embarkation deck from all passenger and crew spaces and from those spaces in which the crew is normally employed are being maintained (SOLAS 74/00 regs.II-2/13.2, 13.3.1, 13.3.2 and 13.7; FSS Code chs.11 and 13 (except paragraph 3)) (SOLAS 74/88 reg.II-2/28);

9.2.3.95 confirming that the means of escape from any special category spaces and ro-ro spaces are satisfactory (SOLAS 74/00 regs.II-2/13.5 and 13.6) (SOLAS 74/88 reg.II-2/28);

9.2.3.96 confirming that the means of escape from the machinery spaces are satisfactory (SOLAS 74/00 reg.II-2/13.4.1) (SOLAS 74/88 reg.II-2/28);

9.2.3.97 examining the fire-extinguishing arrangements, examining and testing the fire detection and alarm systems and the sample extraction smoke detection systems, where applicable in cargo spaces for general cargo and dangerous goods and testing, as far as practicable and as appropriate, the operation of the means for closing the various openings (SOLAS 74/00 regs.II-2/7.6 and 10.7; FSS Code chs.5, 9 and 10) (SOLAS 74/88 reg. II-2/39);

9.2.3.98 examining the fire-extinguishing arrangements examining and testing the fire detection and alarm system and the sample extraction smoke detection system, where applicable, in vehicle, special category and ro-ro spaces and testing, as far as practicable and as appropriate, the operation of the means for closing the various openings (SOLAS 74/00 reg. II-2/20 (except 20.5); FSS Code chs.5, 6, 7, 9 and 10) (SOLAS 74/88 regs.II-2/37, 38 and 38-1);

9.2.3.99 examining and testing, as appropriate and as far as practicable, the crew alarm and the public address system or other effective means of communication (SOLAS 74/00 regs.II-2/7.9 and 12; LSA Code ch.7) (SOLAS 74/88 reg.II-2/40);

9.2.3.100 examining, when appropriate, the special arrangements for carrying dangerous goods, including checking the electrical equipment and wiring, ventilation, the provision of personnel protection clothing and portable appliances, testing any fire detection and alarm system and any sample extraction smoke detection system and testing, as far as practicable, the water supply, bilge pumping and any water spray system (SOLAS 74/00/08 reg. II-2/19 (except 19.3.8, 19.3.10 and 19.4); FSS Code chs.3, 4, 7, 9 and 10) (SOLAS 74/88 regs.II-2/41 and 54);

9.2.3.101 examining, when appropriate, the helicopter facilities (SOLAS 74/00 regs.II-2/18, III/28) (SOLAS 74/88 reg.II-2/18.8);

9.2.3.102 checking the requirement for passenger ships carrying more than 36 passengers and constructed before 1 October 1994 (SOLAS 74/88/92 regs.II-2/41-1 and 41-2);

9.2.3.103 for passenger ships constructed on or after 1 July 2010 and having a length of 120 m or more or having three or more main vertical zones, checking the designation of safe areas (SOLAS 74/06 reg.II-2/21);

9.2.3.104 for passenger ships constructed on or after 1 July 2010, checking the provision of a safety centre (SOLAS 74/06 reg.II-2/23) and its associated ventilation system (SOLAS 74/06 reg.II-2/8.2);

9.2.3.105 checking that emergency instructions are available for each person on board, the muster list is posted inconspicuous places and there are signs or posters in the vicinity of survival craft and their launching stations (SOLAS 74/96 regs.III/8, 9 and 37);

9.2.3.106 checking that the falls used in launching have been periodically inspected and have been renewed in the past five years (SOLAS 74/96/04 reg.III/20);

9.2.3.107 examining each survival craft, including its equipment and, when fitted, the on-load release mechanism and hydrostatic lock, and for inflatable liferafts the hydrostatic release unit and float free arrangements, including the date of servicing or replacement. Checking that the hand-flares are not out of date and that the required number of search and rescue locating devices are fitted in liferafts and those liferafts are clearly marked (SOLAS 74/96/00/02/08 regs.III/20, 21, 23, 24 and 26; LSA Code sections 2.3 to 2.5, 3.2 and 4.1 to 4.6);

9.2.3.108 checking that the life-saving appliances are of international or vivid reddish orange, or a comparably highly visible colour on all parts where this will assist detection at sea (LSA Code section 1.2.2.6);

9.2.3.109 examining the embarkation arrangements and launching appliances for each survival craft. Each lifeboat should be lowered to the embarkation position or, if the stowage position is the embarkation position, lowered a short distance and, if practicable, one of the survival craft should be lowered to the water. The operation of the launching appliances for davit launched liferafts should be demonstrated. (SOLAS 74/96/04 regs.III/11, 12, 13, 15, 16, 20, 21 and 23; LSA Code sections 6.1 and 6.2);

9.2.3.110 checking that a thorough examination of launching appliances, including the dynamic testing of the winch brake, and servicing of lifeboat and rescue boat on-load release gear and davit-launched life raft automatic release hooks have been carried out. (SOLAS 74/00/12 reg. III/ 20);

9.2.3.111 checking the rotational deployment of MES (SOLAS 74/88 reg.III/20.8.2; LSA Code section 6.2.2.2);

9.2.3.112 examining each rescue boat, including its equipment. For inflatable rescue boats, confirming that they are stowed in a fully inflated condition (SOLAS 74/88/04 regs.III/14, 17, 21, 26.3 and 34);

9.2.3.113 examining the embarkation and recovery arrangements for each rescue boat (SOLAS 74/88 reg,III/14);

9.2.3.114 checking the arrangements for mustering passengers (SOLAS 74/96 regs.III/11, 24 and 25);

9.2.3.115 confirming that a means of rescue is provided on ro-ro passenger ships (SOLAS 74/00 regs.III/11, 26.4);

9.2.3.116 confirming that a helicopter pick-up area is provided on ro-ro passenger ships (SOLAS 74/00 reg.III/28);

9.2.3.117 confirming that a decision support system is provided for the Master (SOLAS 74/88 reg. III/29) (SOLAS 74/06 regs. II-2/21 and 22);

9.2.3.118 testing that the engine of the rescue boat(s) and of each lifeboat, when so fitted, start satisfactorily and operate both ahead and astern;

9.2.3.119 examining and checking the operation of two-way VHF radiotelephone apparatus and search and rescue locating devices (SOLAS 74/88/08 regs.III/6, IV/7 and 14);

9.2.3.120 examining the line-throwing appliance and checking that its rockets and the ship's distress signals are not out of date (SOLAS 74/96 regs.III/6, 18 and 35; LSA Code sections 3.1 and 7.1);

9.2.3.121 examining and checking the operation of onboard communications equipment and verifying that the general alarm system is audible in accommodation, normal crew working spaces and on open decks (SOLAS 74/96 regs.III/6, 18 and 35; LSA Code sections 3.1 and 7.1);

9.2.3.122 examining the provision, disposition, stowage and condition of the lifebuoys, including those fitted with self-igniting lights, self-activating smoke signals and buoyant lines, lifejackets*, immersion suits, anti-exposure suits and thermal protective aids and that their associated batteries are not out of date (SOLAS 74/88/06 regs.III/7, 21, 22 and 26; LSA Code sections 2.1 to 2.5 and 3.1 to 3.3);

- checking the provision of lifejackets in three sizes (Infant, Child, Adult) and checking that they are marked by either weight or height, or by both weight and height (LSA Code section 2.2.1.1). For passenger ships on voyages less than 24 h, checking that the number of infant lifejackets equals to at least 2.5% of the number of passengers on board and for passenger ships on voyages 24 h or greater, checking that infant lifejackets are provided for each infant on board (SOLAS 74/06 reg.III/7.2.1);
- checking that immersion suits designed to be worn in conjunction with a lifejacket are suitably marked (LSA Code section 2.3.1);

9.2.3.123 checking the lighting of the muster and embarkation stations and the alleyways, stairways and exits giving access to the muster and embarkation stations, including when supplied from the emergency source of power (SOLAS 74/88 regs.II-1/42 and III/11);

9.2.3.124 checking that the required navigation lights, shapes and sound signalling equipment are in order (COLREG, rules 20 to 24, 27 to 30 and 33);

9.2.3.125 checking the provision and specification of the following navigation equipment as appropriate: daylight signalling lamp, magnetic compass, transmitting heading device, gyro compass, gyro compass repeaters, radar installation(s), electronic plotting aid, automatic tracking aid(s) or automatic radar plotting aid(s), echo-sounding device, speed and distance indicator, rudder angle indicator, propeller rate-of-revolution indicator, variable pitch propeller pitch and operational mode indicator, rate-of-turn indicator, heading or track control system, GNSS receiver, terrestrial radio navigation system and sound reception system, a pelorus or compass bearing device, means for correcting heading and bearings, a BNWAS, as applicable, and ECDIS including back-up arrangements, as applicable. Items that cannot be checked with the ship in port should be verified from records (SOLAS 74/00/09/13 reg.V/19);

9.2.3.126 checking for the provision, specification operation and annual performance test of the voyage data recorder (SOLAS 74/00/04 reg.V/20);

9.2.3.127 checking that the International Code of Signals and an up-to-date copy of Volume III of the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual have been provided. (SOLAS 74/00/02 reg. V/21);

9.2.3.128 checking that a valid conformance test report of the long-range identification and tracking system is available on board, where fitted (SOLAS 74/04 reg.V/19-1);

9.2.3.129 checking the provision and operation of the automatic identification system, where fitted, and whether the annual test has been carried out and a copy of the test report is on board (SOLAS 74/00/04/10 regs.V/18.9 and 19);

9.2.3.130 checking the provision and specification of the pilot ladders and pilot transfer arrangements (SOLAS 74/00/10 reg. V/23);

9.2.3.131 checking the provisions of (PI) 5.1.2.115 to (PI) 5.1.2.140 and (PI) 5.1.2.143 to (PI) 5.1.2.145;

9.2.3.132 confirming that no new materials containing asbestos were installed on board (SOLAS 74/00/05/09 reg. II-1/3-5)*.

9.2.3.133 checking that the means of embarkation and disembarkation from ships for use in port and in port related operations, such as gangways and accommodation ladders, are in satisfactory condition, as applicable (SOLAS 74/08 reg.II-1/3-9);

9.2.3.134 confirming, where applicable, that an appropriate portable atmosphere testing instrument or instruments† is on board, and that suitable means are provided for the calibration of all such instruments; and checking appropriateness of the testing and calibration (SOLAS 74/14 reg. XI-1/7‡).

Section 10 – Survey of the Outside of the Ship's Bottom

10.1 General

10.1.1 An inspection of the outside of the ship's bottom is an inspection of the underwater part of the ship and related items to ensure that they are in a satisfactory condition and fit for the service for which the ship is intended.

10.1.2 The Owner is to notify the DBS Society whenever the outside of the ship's bottom and related items can be examined in drydock or on a slipway.

10.1.3 There is to be a minimum of two examinations of the outside of the ship's bottom and related items during each five-year special survey period. One such examination is to be carried out in conjunction with the special survey. In all cases the interval between any two such examinations is not to exceed 36 months. An extension of examination of the ship's bottom of 3 months beyond the due date can be granted in exceptional circumstances. 'Exceptional circumstances' means unavailability of dry-docking facilities; unavailability of repair facilities; unavailability of essential materials, equipment or spare parts; or delays incurred by action taken to avoid severe weather conditions.

10.1.4 Examinations of the outside of the ship's bottom and related items of ships is normally to be carried out with the ship in drydock. However, consideration may be given to alternate examination while the ship is afloat as an In-water Survey, subject to provisions of 10.3. Special consideration is to be given to ships of 15 years or over before being permitted to have such examinations. For ESP ships of 15 years of age and over, such examinations are to be carried out with the ship in drydock.

10.1.5 The interval between examinations of the outside of the ship's bottom and related items for ships operating in fresh water and for certain harbour or non-self-propelled craft may be greater than that given in 10.1.2.

10.2 Applicability of the survey

10.2.1 When a ship is in drydock or on a slipway, it is to be placed on blocks of sufficient height and with the necessary staging to permit the examination of elements such as shell plating including bottom and bow plating, stern frame and rudder, sea chests and valves, propeller, etc.

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

10.2.3 Sea chests and their gratings, sea connections and overboard discharge valves and cocks and their fastenings to the hull or sea chests are to be examined. Valves and cocks need not be opened up more than once in a special survey period unless considered necessary by the Surveyor.

10.2.4 Visible parts of rudder, rudder pintles, rudder shafts and couplings and stern frame are to be examined. If considered necessary by the Surveyor, the rudder is to be lifted or the inspection plates removed for the examination of pintles. The clearance in the rudder bearings is to be ascertained and recorded. Where applicable, pressure test of the rudder may be required as deemed necessary by the surveyor.

10.2.5 Visible parts of propeller and stern bush, are to be examined. The clearance in the stern bush and the efficiency of the oil gland, if fitted, are to be ascertained and recorded. For controllable pitch propellers, the Surveyor is to be satisfied with the fastenings and tightness of hub and blade sealing. Dismantling need not to be carried out unless considered necessary by the Surveyor.

10.2.6 Visible parts of side thrusters are to be examined. Other propulsion systems which also have manoeuvring characteristics (such as directional propellers, vertical axis propellers, water jet units) are to be examined externally with focus on the condition of gear housing, propeller blades, bolt locking and other fastening arrangements. Sealing arrangement of propeller blades, propeller shaft and steering column shall be verified.
NOTE: For the survey of propeller shafts, refer to Section 13.

10.2.7 Special consideration may be given in application of relevant sections of this Unified Requirement to commercial vessels owned or chartered by Governments, which are utilized in support of military operations or service.

10.2.8 After a satisfactory survey, the Cargo Ship Safety Construction Certificate can be endorsed

10.2.9 If a survey shows that the condition of a ship or its equipment is unsatisfactory, DBS society will apply actions of Part 1, Chapter 3 Section 1 paragraphs 1.3.3, 1.3.4 and 1.3.5.

10.3 In-Water Surveys

10.3.1 The In-water Survey is to provide the information normally obtained from a docking survey. Special consideration shall be given to ascertaining rudder bearing clearances and stern bush clearances of oil stern bearings based on a review of the operating history, on board testing and stern oil sample reports. These considerations are to be included in the proposals for in-water survey which are to be submitted in advance of the survey so that satisfactory arrangements can be agreed with the Classification Society.

10.3.2 The In-water Survey is to be carried out with the ship in sheltered water and preferably with weak tidal streams and currents. The in-water visibility and the cleanliness of the hull below the waterline is to be clear enough to permit a meaningful examination which allows the surveyor and diver to determine the condition of the plating, appendages and the welding. The Classification Society is to be satisfied with the methods of orientation of the divers on the plating, which should make use where necessary of permanent markings on the plating at selected points.

10.3.3 The equipment, procedure for observing and reporting the survey are to be discussed with the parties involved prior to the In-water Survey, and suitable time is to be allowed to permit the diving company to test all equipment beforehand.

10.3.4 The In-water Survey is to be carried out by a qualified diver under surveillance of a Surveyor. The diver is to be employed by a firm approved as a service supplier according to Ch 1/Sec 3 of this Part.

10.3.5 The Surveyor is to be satisfied with the method of pictorial representation, and a good two-way communication between the Surveyor and divers is to be provided.

10.3.6 If the In-water Survey reveals damage or deterioration that requires early attention, the Surveyor may require that the ship be drydocked in order that a detailed survey can be undertaken and the necessary repairs carried out.

Section 11 – Boiler Surveys

11.1 Frequency and type of Survey

11.1.1 Special Surveys

11.1.1.1 Special Surveys are to be carried out at 5 years' intervals to renew the Class Certificate.

11.1.1.2 The first Special Survey is to be completed within 5 years from the date of the initial classification survey and thereafter 5 years from the credited date of the previous Special Survey. However, an extension of class of 3 months maximum beyond the 5th year can be granted in exceptional circumstances.

11.1.1.3 In this case, the next period of class will start from the expiry date of the Special Survey before the extension was granted.

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

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

11.1.2 Annual Surveys

11.1.2.1 Annual Surveys are to be held within 3 months before or after each anniversary date of the date of the initial classification survey or the completion of the last Special Survey.

11.1.2.2 They will normally be performed at the same time as an Annual Hull or Load Line survey.

11.1.3 Continuous Surveys.

11.1.3.1 Special Surveys of machinery may be carried out on a continuous survey basis. In this case, the interval between consecutive examinations of each item is not to exceed five (5) years.

11.2 Survey of Steam Boilers

11.2.1 Internal surveys

Water tube boilers used for main propulsion, including reheat boilers, all other boilers of essential service, and boilers of non-essential service having working pressure exceeding 0.35 N/mm^2 (3.5 bar) and a heating surface exceeding 4.5 m^2, are to be surveyed internally. There is to be a minimum of two internal examinations during each 5-year special survey period. In all cases the interval between any two such examinations is not to exceed 36 months. An extension of examination of the boiler of up to 3 months beyond the due date can be granted in exceptional circumstances[1]. (See 2.3).

At each survey, the boilers, super heaters, and economizers are to be examined internally *on water-steam side and fire side.* Boiler mountings and safety valves are to be examined at each survey and opened out as considered necessary by the DBS Classification Society.

When direct visual internal inspection is not feasible due to the limited size of the internal spaces, such as for small boilers and/or narrow internal spaces, this may be replaced by a hydrostatic pressure test or by alternative verifications as determined by the Classification Society.

The adjustment of the safety valves is to be verified during each boiler internal survey. Boiler safety valve and its relieving gear are to be examined and tested to verify satisfactory operation. However, for exhaust gas heated economizers, if steam cannot be raised at port, the safety valves may be set by the Chief Engineer at sea, and the results recorded in the log book for review by the Classification Society.

Review of the following records since the last Boiler Survey is to be carried out as part of the survey:

- Operation
- Maintenance
- Repair history
- Feedwater chemistry

11.2.2 **External surveys**

External survey of boilers including test of safety and protective devices, and test of safety valve using its relieving gear, is to be carried out annually, within the window of the Annual Survey of a ship. For exhaust gas heated economizers, the safety valves are to be tested by the Chief Engineer at sea within the annual survey window. This test is to be recorded in the log book for review by the attending Surveyor prior to crediting the Annual Survey of Machinery.

11.2.3 **Extension of the time of surveys**

An extension may be granted by the Classification Society, on the basis of Para. 2.1, after the following is satisfactorily carried out:

- External examination of the boiler
- Boiler safety valve relieving gear (easing gear) is to be examined and operationally tested
- Boiler protective devices operationally tested
- Review of the following records since the last Boiler Survey:
  - Operation
  - Maintenance
  - Repair history
  - Feedwater chemistry

11.2.4 **Exhaust Gas Heated Economizers**

In addition to the other requirements of 2.1 ***(internal examination)*** in exhaust gas heated economizers of the shell type, ***all*** accessible welded joints are to be subjected to a ***visual*** examination for cracking. Nondestructive Testing may be required for this purpose.

11.3 Propulsion Steam Turbines: Modification of First Special Survey

11.3.1 Where the propulsion steam turbines are of a well-known type, and fitted with rotor position indicators and vibration indicators of an approved type, as well as measuring equipment of steam pressure at proper locations along the steam flow, and the arrangements for change over in case of emergency operation of the plant are readily operable, the first Special Survey may be limited to the examination of rotor bearings, thrust bearings and flexible couplings, provided the surveyor has been satisfied from operation service records and power trials subsequent to the survey, that the turbine plant is in good working condition.

11.3.2 Turbine casings should be opened at the next Special Survey and subsequent Special Surveys.

11.4 Machinery Verification Runs

11.4.1 As part of the Special Survey of Machinery, a dock trial is to be carried out to attending Surveyors' satisfaction to confirm satisfactory operation of main and auxiliary machinery. If significant repairs are carried out to main or auxiliary machinery or steering gear, consideration should be given to a sea trial to attending Surveyors' satisfaction.

Note: Special consideration may be given in application of relevant sections of this Unified Requirement to commercial vessels owned or chartered by Governments, which are utilized in support of military operations or service.

Section 12 – Pipes surveys

12.1 General

12.1.1 The present regulations are related to piping-systems made of carbon, carbon-manganese, alloy steels or non-ferrous material normally installed on board ships for services considered in Table 1.

12.1.2 These regulations cover the following services:

12.1.2.1 Air, vapour, gas (excluding liquefied gas cargo and process piping), water, lubricating oil, fuel oil, hydraulic fluid systems for steering gear, toxic gas and liquids, cargo oil and tank cleaning piping and open ended lines such as drains, overflows, vents and boiler escape pipes.

12.1.2.2 They do not include pipes forming integral part of a boiler.

12.1.2.3 Hydraulic fluid systems other than those for steering gear are not covered by these regulations.

12.1.3 These requirements do not apply to cargo piping systems of ships carrying chemicals in bulk.

Piping System for	Class I P> or T>		Class II	Class III P≤ & T≤	
Toxic or corrosive media	Without special safeguards		With special safeguards (1,2)	Not applicable	
Flammable media heated above flash point or with flash point below 60°C Liquefied Gas	Without special safeguards		With special safeguards (1)	Not Applicable	
Steam	16	300	Any pressure-temperature combination not belong to Class I or III	7	170
Thermal Oil	16	300		7	150
Fuel Oil Lubricating Oil Flammable Hydraulic Oil	16	150		7	60
Other Media (5,6)	40	300		16	200

Notes:
1) Safeguards for reducing leakage possibility and limiting its consequences :
e.g. pipes led in positions where leakage of internal fluids will not cause a potential hazard or damage to surrounding areas which may include the use of pipe ducts, shielding, screening etc.
2) Class II pipes are not to be used for toxic media
3) Cargo oil pipes belong to Class III
4) P = Design pressure (bar), as defined in P1.2.7 T = Design temperature (°C), as defined in P1.2.8
5) Including water, air, gases, non-flammable hydraulic oil
6) Open ended pipes (drains, overflows, vents, exhaust gas lines, boiler escape pipes) irrespecitve of T, belong to Class III

Table 1: Different types of pipes installed onboard vessels

12.2 Classes of pipes

12.2.1 For survey and testing, the type of joint to be adopted, heat treatment and welding procedure, pipes are subdivided into three classes as indicated in Figure 1 and Table 1.

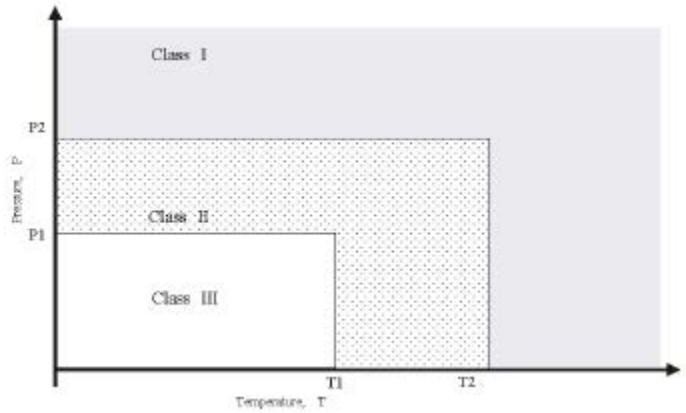


Figure 1: Classes of pipes with respect to the pressure and temperature working conditions

12.3 Requirements for steam pipes

12.3.1 For saturated steam pipes and superheated steam pipes in which the temperature of the steam at the superheater outlet does not go beyond 450°C, survey is to be executed 10 years from the date of build (or installation) and subsequently at five-year intervals.

12.3.2 For superheated steam pipes where the temperature of the steam at the superheater outlet is over 450°C, survey is to be done five (5) years from the date of build (or installation) and subsequently at five-year intervals.

12.3.3 After 10 years from the date of build (or installation) subsequently at five-year intervals, copper or copper alloy steam pipes over 76 mm external diameter that supply steam for vital services at sea, are to be hydraulically tested to up to two times the working pressure.

12.4 Requirements for pipes intended for liquefied gases

12.4.1 The requirements of this section apply to piping inside and outside the cargo tanks.

12.4.2 Pressure tests (strength and leak test)

12.4.2.1 After assembly, all cargo and process piping should be subjected to a hydrostatic test to at least 1,5 times the design pressure. However, when piping systems or parts of systems are completely manufactured and equipped with all fittings, the hydrostatic test may be conducted prior to installation aboard ship. Joints welded on board should be hydrostatically tested to at least 1,5 times the design pressure. Where water cannot be tolerated and the piping cannot be dried prior to putting the system into service, proposals for alternative testing fluids or testing means should be submitted to the Classification Society for approval.

12.4.2.2 After assembly on board each cargo and process piping system is to be subjected to a leak test (by air, halides, etc.) to a pressure depending on the leak detection method applied.

12.4.3 Functional tests

12.4.3.1 All piping systems including all valves, fittings and associated equipment for handling cargo or vapours are to be tested under normal operating conditions not later than at the first loading operation.

12.5 Surveys and testing of pipes

12.5.1 All Classes I and II pipes and integral fittings and, in all cases, all steam pipes, feed pipes, compresses air pipes and fuel oil pipes having a design pressure greater than 3,5 bar and relative integral fittings, after completion of manufacture but before insulation and coating, if any, shall be subject to a hydrostatic test in the presence of the DBS Surveyor at the following value of pressure:

$$P_H = 1.5P$$

Where P_H is the test pressure (bar) and P is the design pressure (bar).

12.5.2 For steel pipes and integral fittings for temperatures above 300°C, the test pressure is to be determined by the following formula but it is not necessary that it exceeds 2P:

$$P_H = 1.5P\frac{K_{100}}{K_T}$$

Where K_{100} is the permissible stress at 100°C and K_T is the permissible stress at the design temperature.

The value of the test pressure may be reduced, with the approval of the DBS Society, to 1,5P to avoid excessive stress in way of bends, T-pieces, etc.

In no case is the membrane stress to exceed 90 percent of the yield stress at the testing temperature.

12.5.3 When, for technical reasons, it is not possible to carry out complete hydrotesting before assembly on board, for all sections of piping, proposals are to be submitted for approval to the DBS Society for testing the closing lengths of piping, particularly in respect to the closing seams.

12.5.4 When the hydrostatic test of piping is carried out on board, these tests may be carried out in conjunction with the test required in 12.5.6.

12.5.5 Pressure testing of small bore pipes (less than about 15 mm) may be waived at the discretion of the DBS Society depending on the application.

12.5.6 After assembly on board, the following tightness tests are to be carried out in the presence of the DBS Surveyor. In general, all the piping systems covered by these requirements are to be checked for leakage under operational conditions and, if necessary, using special techniques other than hydrostatic testing. In particular, heating coils in tanks and liquid or gas fuel lines are to be tested to not less than 1,5P but in no case less than 4 bar.

12.5.7 At each survey, some main steam pipes and auxiliary steam pipes, which:
- are over 76 mm external diameter,
- supply steam for vital services at sea, and
- have bolted joints

are to be removed for internal examination and are to be hydraulically tested to 1.5 times the working pressure. If these are satisfactory in all respects, rest of them need not be tested. It is to be made a point that pipes are selected in rotation for examination and hydraulic testing, so that during surveys all the pipes will be tested.

12.5.8 Where main and/or auxiliary steam pipes have welded joints between the length of pipe and/or between pipes and valves, the lagging between their welds is to be removed, and these examined and, if considered necessary by the Surveyor, crack detected. Pipe ranges having welded joints are to be hydraulically tested to 1.5 times the working pressure. Where lengths having, ordinary bolted joints are fitted in such pipe ranges and can be easily disconnected, they are to be removed for internal examination and hydraulically tested to 1.5 times the working pressure.

12.5.9 For cylindrical boilers having smoke tube superheaters and where the saturated steam pipes adjoining the saturated steam headers are partially located in the boiler smoke boxes, pipes adjoining and cross-connecting these headers in the smoke boxes are, included in the pipes selected for examination and testing, as defined in [12.5.7]. Where saturated steam pipes inside the smoke boxes have steel castings of substantial construction, above mentioned requisites need be applied to a sample casting. Where steel castings are not fitted, it is the discretion of the Surveyor whether he wants to remove a sample pipe for examination at Boiler Survey or is satisfied with the condition of the ends of the saturated steam pipes in the smoke boxes.

12.5.10 At surveys specified in [12.3.3], any of the copper or copper alloy pipes with expansion or other bends as well as closing lengths adjacent to steam driven machinery, may be subjected to bending and/or vibration, are to be annealed before testing.

12.5.11 Where the Owner fulfills all the requirements of a Steam Pipe Survey at its due date, the Committee will consider delaying the survey, partly or wholly.

Section 13 – Surveys of screw shafts, tube shafts and propellers

13.1 Application

13.1.1 The requirements of the current Section 13: Surveys of Screw Shafts, Tube Shafts, and Propellers, are applied to all vessels with a conventional type of propeller shaft system unless if other equipment can substitute equivalent the inspections safeguarding the condition of the propeller shaft system installation.

13.2 Definitions

13.2.1 For reasons of convenience and common understanding of this requirement the following technical terms are defined (The terms are presented in alphabetic order):

Alternative means	Shafting arrangements such as, but not limited to, an approved Condition Monitoring Scheme and/or other reliable approved means for assessing and monitoring the condition of the tail shaft, bearings, sealing devices and the stern tube lubricant system. The system is capable of assuring the condition of the propeller shaft assembly with an equivalent level of safety as obtained by survey methods as applicable in IACS UR Z21.
Close Loop (system) Oil Lubricated bearing	This arrangement uses oil to lubricate the bearings. The bearings are sealed against the environment (seawater) by adequate sealing/gland devices.
Closed Loop system Fresh water Lubricating bearing	This arrangement refers to a system in which fresh water is used to lubricate the bearings. The bearings are sealed against the environment (such as seawater) by adequate sealing/gland devices.
Corrosion Resistant shaft	Corrosion resistant shaft is made of approved corrosion-resistant steel as core material for the shaft.
Flanged connection	This connection refers to the coupling arrangement, in which the shaft and the propeller, achieved by a flange, built in at the shaft aft end, bolted to propeller boss.
Fresh water sample test	Freshwater sample test should be performed every six (6) months at most. The samples should be taken in service conditions assuring that water sample from the stern tube is examined. Documentation with the water sample results should be retained available to the surveyor for inspection. During the inspection sample should be taken under the presence of the surveyor and testing should include the measurement of the chlorides content, the pH value and the presence of bearing particles or other particles (only for laboratory analysis, not required for tests carried out in the presence of the surveyor).
Keyed connection	This type of connection refers to a forced coupling arrangement in which the shaft and the propeller with a key and keyway achieved through the interference fit of the propeller boss on the tapered shaft end.
Keyless connection	This type of connection refers to a forced coupling arrangement in which the shaft and the propeller without a key achieved through interference fit of the propeller boss on the shaft tapered end.
Lubricating oil analysis	Lubricating oil analysis should be performed at regular intervals not exceeding six (6) months taking into account IACS Rec. 36. Documentation with the results of the lubricating oil analysis must be retained onboard ready for inspection. The oil samples for the analysis should be taken in service conditions.

Means capable to protect against corrosion	It refers to means that may adequately protect the core shaft against sea water intrusion and subsequent corrosion attack. This kind of means is applied for the protection of common steel material against corrosion particularly in combination with water lubricated bearings. Typical means among other are: ▪ continuous metallic, corrosion resistant liners, ▪ continuous cladding, ▪ multiple layer synthetic coating, ▪ multiple layers of fiberglass, ▪ combinations of above-mentioned, ▪ rubber/elastomer covering coating. The means for protection against corrosion are installed and applied according to class approved procedures.
Oil sample examination	It refers to the visual inspection of the stern tube lubricating oil taken in the presence of the surveyor checking mainly for water contamination.
Open systems (water)	These lubricating systems use water to lubricate the bearings and which are in turn exposed to the environment.
Service records	Documentation of the main service parameters of the shaft(s) taken in service time, must be retained ready for inspection. The observed data should include among others the lubricating oil temperature, the bearing temperature and the oil consumption records (for oil lubricated bearings) or water flow, water temperature, salinity, pH, make-up water and water pressure (for closed loop freshwater lubricated bearings depending on design).
Shaft	The Shaft is a general definition consisting of the propeller shaft and the tube shaft. However, it is not included by any mean, the intermediate shaft(s) which is(are) considered part of the propulsion shafting inside the vessel.
Sterntube	Tube or pipe fitted in the shell of a ship at the stern (or rear part of the ship), below the waterline, through which passes the tube shaft or aftermost section of the propeller-shaft. Stern tube is the housing of the shaft bearings, generally two (one aft and one fore), that sustain the shaft and allows its rotation with less frictional resistance. The stern tube also accommodates the shaft sealing arrangement.
Sterntube sealing system	Stern Tube Sealing system is the equipment installed on the inboard extremity and, for closed systems, at the outboard extremity of the stern tube. The inboard seal is a device fitted on the fore part of the stern tube that achieves the sealing against the possible leakage of the lubricant media into the ship internal. On the other hand, the outboard seal is the device fitted on the aft part of the stern tube that achieves the sealing against the possible sea water ingress and the leakage of the lubricant media.
Tube shaft	Tube shaft is a shaft placed between the intermediate shaft and propeller shaft, normally arranged within a stern tube or running in open water. It may also be called Stern Tube Shaft.
Water Lubricating bearing	This arrangement refers to bearing lubrication and cooling via water (fresh or salt).

13.2 Oil Lubricated shafts or Closed Loop System Fresh Water Lubricated Shafts (closed system)

13.2.1 Shaft Survey Methods

METHOD 1

The survey is to consist of:

- Drawing the shaft and examining the entire shaft, seals system and bearings

- For keyed and keyless connections:
  - Removing the propeller to expose the forward end of the taper,
  - Performing a non-destructive examination (NDE) by an approved surface crack- detection method all around the shaft in the way of the forward portion of the taper section, including the keyway (if fitted). For shaft provided with liners, the NDE shall be extended to the after edge of the liner.
- For flanged connection:
  - Whenever the coupling bolts of any type of flange-connected shaft are removed, or the flange radius is made accessible in connection with an overhaul, repairs or when deemed necessary by the surveyor, the coupling bolts, and flange radius are to be examined using an approved surface crack detection method.
- Checking and recording the bearing clearances.
- Verification that the propeller is free of damages which may cause the propeller to be out of balance.
- Verification of the satisfactory conditions of inboard and outboard seals during the reinstallation of the shaft and propeller.
- Recording the bearing wear down measurements (after re-installation)

METHOD 2

The survey is to consist of:

- For keyed and keyless connections:
  - Removing the propeller to expose the forward end of the taper,
  - Performing a non-destructive examination (NDE) by an approved surface crack- detection Method all around the shaft in the way of the forward portion of the taper section, including the keyway (if fitted).
- For flanged connection:
  - Whenever the coupling bolts of any type of flange-connected shaft are removed, or the flange radius is made accessible in connection with an overhaul, repairs or when deemed necessary by the surveyor, the coupling bolts, and flange radius are to be examined using an approved surface crack detection Method.
- Checking and recording the bearing wear down measurements.
- Visual Inspection of all accessible parts of the shafting system.
- Verification that the propeller is free of damages which may cause the propeller to be out of balance.
- Seal liner found to be or placed in a satisfactory condition.
- Verification of the satisfactory re-installation of the propeller including verification of satisfactory conditions of inboard and outboard seals.

To implement successfully the METHOD 2 the following prerequisites should be satisfied:

- Review of service records.
- Review of test records of:
  - Lubricating Oil analysis (for oil lubricated shafts), or
  - Fresh Water Sample test (for closed system fresh water lubricated shafts).
- Oil sample examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).
- Verification of no reported repairs by grinding or welding of the shaft and/or propeller.

METHOD 3

The survey is to consist of:

- Checking and recording the bearing wear down measurements.
- Visual Inspection of all accessible parts of the shafting system.
- Verification that the propeller is free of damages which may cause the propeller to be out of balance.
- Seal liner found to be or placed in a satisfactory condition.
- Verification of the satisfactory conditions of inboard and outboard seals.

To implement successfully the METHOD 3 the following prerequisites should be satisfied:

- Review of service records.
- Review of test records of
  - Lubricating Oil analysis (for oil lubricated shafts), or
  - Fresh Water Sample test (for closed system fresh water lubricated shafts).
- Oil sample Examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).
- Verification of no reported repairs by grinding or welding of the shaft and/or propeller.

13.2.2 Shaft extension surveys - Extension types

Extension up to 2.5 years

The survey is to consist of:
- Checking and recording the bearing wear down measurements, as far as practicable.
- Visual Inspection of all accessible parts of the shafting system.
- Verification that the propeller is free of damages which may cause the propeller to be out of balance.
- Verification of the effectiveness of the inboard seal and outboard seals.
- Pre-requisites to satisfactorily verify to apply EXTENSION UP TO 2.5 YEARS:
- Review of service records.
- Review of test records of
  - Lubricating Oil analysis (for oil lubricated shafts), or
  - Fresh Water Sample test (for closed system fresh water lubricated shafts).
- Oil sample Examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).
- Verification of no reported repairs by grinding or welding of shaft and/or propeller.
- Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

Extension up to 1 year

The survey is to consist of:
- Visual Inspection of all accessible parts of the shafting system.
- Verification that the propeller is free of damages which may cause the propeller to be out of balance.
- Verification of the effectiveness of the inboard seal and outboard seals.

Pre-requisites to satisfactorily verify to apply EXTENSION UP TO 1 YEAR:
- Review of the previous wear down and/or clearance recordings.
- Review of service records.
- Review of test records of
  - Lubricating Oil analysis (for oil lubricated shafts), or
  - Fresh Water Sample test (for closed system fresh water lubricated shafts).
- Oil sample Examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).
- Verification of no reported repairs by grinding or welding of the shaft and/or propeller.
- Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

Extension up to 3 months

The survey is to consist of:
- Visual Inspection of all accessible parts of the shafting system.
- Verification of the effectiveness of the inboard seal.

Pre-requisites to satisfactorily verify to apply EXTENSION UP TO 3 MONTHS:
- Review of the previous wear down and/or clearance recordings.
- Review of service records.
- Review of test records of:
  - Lubricating Oil analysis (for oil lubricated shafts), or
  - Fresh Water Sample test (for closed system fresh water lubricated shafts).
- Oil sample Examination (for oil lubricated shafts), or Fresh Water Sample test (for closed system fresh water lubricated).
- Verification of no reported repairs by grinding or welding of the shaft and/or propeller.
- Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

13.2.3 Oil lubricated shafts

13.2.3.1 Survey intervals.
For surveys completed within 3 months before the shaft survey due date, the next period will start from the shaft survey due date.

Flanged propeller connection
The following Methods are applicable:

A. Method 1 every 5 years, or

B. Method 2 every 5 years (pre- requisites have to be fulfilled), or

C. Method 3 every 5 years (prerequisites have to be fulfilled).

Keyless propeller connection
The following Methods are applicable:

A. Method 1 every 5 years, or

B. Method 2 every 5 years (prerequisites have to be fulfilled), or

C. Method 3 every 5 years (prerequisites have to be fulfilled). The maximum interval between two surveys carried out according to Method 1 or Method 2 shall not exceed 15 years, except in the case when one extension for no more than three months is granted.

Keyed propeller connection

The following Methods are applicable:

A. Method 1 every 5 years, or

B. Method 2 every 5 years (prerequisites have to be fulfilled).

13.2.3.2 Survey extensions

For all types of propeller connections, the interval between two consecutive surveys may be extended after the execution of extension survey as follows:

A. **Extension up to a maximum of 2.5 years**: no more than one extension can be granted. No further extension, of another type, can be granted.

B. **Extension up to a maximum of 1 year**: no more than two consecutive "one-year extensions" can be granted. In the event, an additional extension is requested the requirements of the "2.5-year extension" are to be carried out and the shaft survey due date, before the previous extension(s), is extended for a maximum of 2.5 years.

C. **Extension up to a maximum of 3 months**: no more than one "three months' extension" can be granted. In the event an additional extension is requested the requirements of the "one-year extension" or "2.5 years extension" are to be carried out and the shaft survey due date, before the previous extension, is extended for a maximum of one year or 2.5 years.

The extension survey should normally be carried out within 1 month of the shaft survey due date and the extension counts from the shaft survey due date. If the extension survey is carried out more than 1 month before the shaft survey due date, then the period of extension counts from the date of the extension survey was completed.

13.2.4 **Closed loop system fresh water lubricated shafts**

The maximum interval between two surveys carried out according to Method 1 shall not exceed 15 years. An extension for no more than three months can be granted.

13.2.4.1 **Survey intervals**

For surveys completed within 3 months before the shaft survey due date, the next period will start from the shaft survey due date.

Flanged propeller connection

The following Methods are applicable:

A. Method 1 every 5 years, or

B. Method 2 every 5 years (prerequisites have to be fulfilled), or

C. Method 3 every 5 years (prerequisites have to be fulfilled).

Keyless propeller connection

The following Methods are applicable:

A. Method 1 every 5 years, or

B. Method 2 every 5 years (prerequisites have to be fulfilled), or

C. Method 3 every 5 years (prerequisites have to be fulfilled).

Keyed propeller connection

The following Methods are applicable:

A. Method 1 every 5 years, or

B. Method 2 every 5 years (prerequisites have to be fulfilled).

13.2.4.2 **Survey extensions**

For all types of propeller connections, the interval between two consecutive surveys may be extended after the execution of extension survey as follows:

A. Extension up to a maximum of 2.5 years, no more than one extension can be granted. No further extension, of another type, can be granted.

B. Extension up to a maximum of 1 year, no more than two consecutive extensions can be granted. In the event, an additional extension is requested the requirements of the "2.5-year extension" are to be carried out and the shaft survey due date, before the previous extension(s), is extended for a maximum of 2.5 years.

C. Extension up to a maximum of 3 months, no more than one "three months' extension" can be granted. In the event an additional extension is requested the requirements of the "one-year extension" or "2.5 years extension" are to be carried out and the shaft survey due date, before the previous extension, is extended for a maximum of one year or 2.5 years.
The extension survey should normally be carried out within 1 month of the shaft survey due date and the extension counts from the shaft survey due date.
If the extension survey is carried out more than 1 month before the shaft survey due date, then the period of extension counts from the date of the extension survey was completed.
The maximum interval between two surveys carried out according to Method 1 shall not exceed 15 years, except in the case when one extension for no more than three months is granted.

Oil Lubricated			
	Propeller Coupling configuration		
	Flanged	Keyless	Keyed Method 3 not allowed
Every 5 years	Method1 or Method 2 or Method 3	Method1 or Method 2 or Method 3 The max interval between two surveys carried out according to Method 1 or Method 2 shall not exceed 15 years, except when one extension for no more than three months is granted	Method1 or Method 2 or Method 3
Extension 2.5 Y	Yes No more than one extension can be granted. No further extension of another type can be granted	Yes No more than one extension can be granted. No further extension of another type can be granted	Yes No more than one extension can be granted. No further extension of another type can be granted
Extension 1 Y	Yes No more than two consecutive extensions can be granted. In the event, an additional extension isquested requested the requirements of the "2.5-year extension" are to be carried out and the shaft survey due date, before the previous extension(s), is extended to a max of 2.5 years.	Yes No more than two consecutive extensions can be granted. In the event, an additional extension is requested the requirements of the "2.5-year extension" are to be carried out and the shaft survey due date, before the previous extension(s), is extended to a max of 2.5 years.	Yes No more than two consecutive extensions can be granted. In the event, an additional extension is requested the requirements of the "2.5-year extension" are to be carried out and the shaft survey due date, before the previous extension(s), is extended to a max of 2.5 years.
Extension 3 Y	Yes No more than one three months extension can be granted. In the event an additional extension is requested the requirements of the "one-year extension" or "2.5 years extension" are to be carried out and the shaft survey due date, before the previous extension, is extended for a max of one year or 2.5 years	Yes No more than one three months extension can be granted. In the event an additional extension is requested the requirements of the "one-year extension" or "2.5 years extension" are to be carried out and the shaft survey due date, before the previous extension, is extended for a max of one year or 2.5 years	Yes No more than one three months extension can be granted. In the event an additional extension is requested the requirements of the "one-year extension" or "2.5 years extension" are to be carried out and the shaft survey due date, before the previous extension, is extended for a max of one year or 2.5 years

Closed Loop System Fresh Water Lubricated			
	Coupling configuration		
	Flanged	Keyless	Keyed Method 3 not allowed
Every 5 years	Method1 or Method 2 or Method 3	Method1 or Method 2 or Method 3 The max interval between two surveys carried out according to Method 1 or Method 2 shall not exceed 15 years, except when one extension for no more than three months is granted	Method1 or Method 2 or Method 3
Extension 2.5 Y	Yes No more than one extension can be granted. No further extension of another type can be granted	Yes No more than one extension can be granted. No further extension of another type can be granted	Yes No more than one extension can be granted. No further extension of another type can be granted
Extension 1 Y	Yes No more than two consecutive extensions can be granted. In the event, an additional extension is requested the requirements of the "2.5-year extension" are to be carried out and the shaft survey due date, before the previous extension(s), is extended to a max of 2.5 years.	Yes No more than two consecutive extensions can be granted. In the event, an additional extension is requested the requirements of the "2.5-year extension" are to be carried out and the shaft survey due date, before the previous extension(s), is extended to a max of 2.5 years.	Yes No more than two consecutive extensions can be granted. In the event, an additional extension is requested the requirements of the "2.5-year extension" are to be carried out and the shaft survey due date, before the previous extension(s), is extended to a max of 2.5 years.
Extension 3 Y	Yes No more than one three months extension can be granted. In the event an additional extension is requested the requirements of the "one-year extension" or "2.5 years extension" are to be carried out and the shaft survey due date, before the previous extension, is extended for a max of one year or 2.5 years	Yes No more than one three months extension can be granted. In the event an additional extension is requested the requirements of the "one-year extension" or "2.5 years extension" are to be carried out and the shaft survey due date, before the previous extension, is extended for a max of one year or 2.5 years	Yes No more than one three months extension can be granted. In the event an additional extension is requested the requirements of the "one-year extension" or "2.5 years extension" are to be carried out and the shaft survey due date, before the previous extension, is extended for a max of one year or 2.5 years

Table of Survey Intervals (closed systems)

General Notes

For surveys (Method 1, or Method 2, or Method 3) completed within 3 months before the shaft survey due date, the next period will start from the shaft survey due date.

The extension survey should normally be carried out within 1 month of the shaft survey due date and the extension counts from the shaft survey due date. If the extension survey is carried out more than 1 month before the shaft survey due date, then the period of extension counts from the date of the extension survey was completed.

13.3 Water Lubricated shafts (open systems)

13.3.1 Shaft Survey Methods

METHOD 4

The survey is to consist of:
- Drawing the shaft and examining the entire shaft (including liners, corrosion protection system and stress reducing features, where provided), inboard seal system and bearings.
- For keyed and keyless connections:
  - Removing the propeller to expose the forward end of the taper,
  - Performing a non-destructive examination (NDE) by an approved surface crack- detection Method all around the shaft in the way of the forward portion of the taper section, including the keyway (if fitted). For shaft provided with liners the NDE shall be extended to the after edge of the liner
- For flanged connection:
  - Whenever the coupling bolts of any type of flange-connected shaft are removed or the flange radius is made accessible in connection with an overhaul, repairs or when deemed necessary by the surveyor, the coupling bolts, and flange radius are to be examined using an approved surface crack detection method.
- Checking and recording the bearing clearances.
- Verification that the propeller is free of damages which may cause the propeller to be out of balance.
- Verification of the satisfactory conditions of the inboard seals during re-installation of the shaft and propeller.

13.3.2 Shaft extension surveys - Extension types

Extension up to 1 year

The survey is to consist of:
- Visual Inspection of all accessible parts of the shafting system.
- Verification that the propeller is free of damages which may cause the propeller to be - out of balance.
- Checking and recording the clearances of the bearing.
- Verification of the effectiveness of the inboard seal.

Pre-requisites to satisfactorily verify to apply EXTENSION UP TO 1YEAR:
- Review of the previous clearance recordings.
- Service records.
- Verification of no reported repairs by grinding or welding of the shaft and/or propeller.
- Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

Extension up to 3 months

The survey is to consist of:
- Visual Inspection of all accessible parts of the shafting system.
- Verification that the propeller is free of damages which may cause the propeller to be out of balance.
- Verification of the effectiveness of the inboard seal.

Pre-requisites to satisfactorily verify to apply EXTENSION UP TO 3 MONTHS:
- Review of the previous clearance recordings.
- Service records.
- Verification of no reported repairs by grinding or welding of the shaft and/or propeller.
- Confirmation from the Chief Engineer that the shafting arrangement is in good working condition.

13.3.3 Shaft Survey intervals

13.3.3.1 **Survey Intervals**

The following survey intervals between surveys according to Method 4 apply to all types of propeller connections.
- For keyless propeller connections, the maximum interval between two consecutive dismantling and verifications of the shaft cone using non-destructive examination (NDE) shall not exceed 15 years.
- For surveys completed within 3 months before the shaft survey due date, the next period will start from the shaft survey due date.

Configurations allowing 5 year intervals
- Single shaft is operating exclusively in fresh water.
- Single shaft provided with adequate means of corrosion protection, single corrosion resistant shaft.
- All kinds of multiple shafts arrangements.

Other systems

Shaft is not belonging in one of the configurations listed in “Configurations allowing 5 year intervals” has to be surveyed according to Method 4 every 3 years.

13.3.3.2 **Survey extensions**

For all types of propeller connections, the interval between two consecutive surveys may be extended after the execution of extension survey as follows:

A. **Extension up to a maximum of 1 year**: no more than one extension can be granted. No further extension, of another type, can be granted.

B. **Extension up to a maximum of 3 months**: no more than one "three months extension” can be granted. In the event, an additional extension is requested the requirements of the "one-year extension” are to be carried out and the shaft survey due date before the previous extension is extended for a maximum of one year.

The extension survey should normally be carried out within 1 month of the shaft survey due date and the extension counts from the shaft survey due date. If the extension survey is carried out more than 1 month before the shaft survey due date, then the period of extension counts from the date of the extension survey was completed.

<table>
<tr><td colspan="4">SURVEY INTERVALS (OPEN SYSTEMS)</td></tr>
<tr><td colspan="2">1. Single Shaft operating exclusively in Fresh Water
2. Single Shaft provided with adequate means of corrosion protection, Single corrosion-resistant shaft
3. All kinds of Multiple shafts arrangements</td><td colspan="2">Other shaft configuration</td></tr>
<tr><td colspan="2">All kinds of Propeller Coupling

For keyless propeller connections, the maximum interval between two consecutive dismantling and verifications of the shaft cone using non-destructive examination (NDE) shall not exceed 15 years</td><td colspan="2">All kinds of Propeller Coupling

For keyless propeller connections, the maximum interval between two consecutive dismantling and verifications of the shaft cone using non-destructive examination (NDE) shall not exceed 15 years</td></tr>
<tr><td>Every five years

unless an Extension type (Extension 1 Y, Extension 3 M) is applied in between</td><td>Method 4</td><td>Every three years

unless an Extension type (Extension 1 Y, Extension 3 M) is applied in between</td><td>Method 4</td></tr>
<tr><td>Extension 1 Y</td><td>Yes
No more than one extension can be granted. No further extension, of another type, can be granted</td><td>Extension 1 Y</td><td>Yes
No more than one extension can be granted. No further extension, of another type, can be granted</td></tr>
<tr><td>Extension 3 M</td><td>Yes
No more than one extension can be granted. In the event, an additional extension is requested the requirements of the one-year extension are to be carried out, and the shaft survey due date before the previous extension is extended for a maximum of one year</td><td>Extension 3 M</td><td>Yes
No more than one extension can be granted. In the event, an additional extension is requested the requirements of the one-year extension are to be carried out, and the shaft survey due date before the previous extension is extended for a maximum of one year</td></tr>
</table>

Table of Survey Intervals (open system)

General notes:
For surveys (Method 4) completed within 3 months before the shaft survey due date, the next period will start from the shaft survey due date.
The extension survey should normally be carried out within 1 month of the shaft survey due date and the extension counts from the shaft survey due date. If the extension survey is carried out more than 1 month before the shaft survey due date, then the period of extension counts from the date of the extension survey was completed.

Section 14 – Surveys of inert gas systems

14.1 General

14.1.1 All types of inert gas systems are to comply with the following:

14.1.1.1 Plans in diagrammatic form are to be submitted for appraisal and should include the following:
- details and arrangement of the inert gas generating plant including all control and monitoring devices;
- arrangement of the piping system for distribution of the inert gas.

14.1.1.2 An automatic control capable of producing suitable inert gas under all service conditions is to be fitted.

14.1.2 Subsequent surveys are to be carried out at the intervals required by the DBS Classification Society Rules.

14.2 Requirements for all systems on Tankers including Chemical Tankers to which SOLAS regulation II-2/4.5.5.1 applies

14.2.1 An inert gas system is to complying with the applicable requirements of Ch. 15 of the FSS Code, as amended by MSC.367 (93), is to be fitted on tankers to which SOLAS regulation II-2/4.5.5.1 applies. In applying the applicable requirements of Ch. 15 of the FSS Code, any use of the word "Administration" therein is to be considered as meaning the relevant DBS Classification Society. The inert gas system is to be operated in accordance with SOLAS regulation II-2/16.3.3, as amended by MSC.365(93). In applying SOLAS regulation II-2/16.3.3.2, paragraph 2.2.1.2.4 of Ch. 15 of the FSS Code is to be complied with.

14.3 Additional requirements for Nitrogen Generator Systems on Tankers including Chemical Tankers to which SOLAS regulation II-2/4.5.5.1 applies

14.3.1 The following requirements apply where a nitrogen generator system is fitted on board as required by SOLAS regulation II-2/4.5.5.1. For the purpose, the inert gas is to be produced by separating air into its component gases by passing compressed air through a bundle of hollow fibres, semi-permeable membranes or adsorber materials.

14.3.2 In addition to the applicable requirements of Ch. 15 of the FSS Code, as amended by MSC.367(93), the nitrogen generator system is to comply with SOLAS Reg.regulations II-2/4.5.3.4.2, 4.5.6.3, and 11.6.3.4.

14.3.3 A nitrogen generator is to consists of a feed air treatment system and any number of membrane or adsorber modules in parallel necessary to meet paragraph 2.2.1.2.4 of Ch.15 of the FSS Code, as amended by MSC.367(93)

14.3.4 The nitrogen generator is to be capable of delivering high purity nitrogen in accordance with paragraph 2.2.1.2.5 of Ch.15 of the FSS Code, as amended by MSC.367(93). In addition to paragraph 2.2.2.4 of Ch.15 of the FSS Code, as amended by MSC.367(93), the system is to be fitted with automatic means to discharge "off-spec" gas to the atmosphere during start-up and abnormal operation.

14.3.5 The system is to be provided with one or more compressors to generate enough positive pressure to be capable of delivering the total volume of gas required by 2.2.1.2 of the FSS Code, as amended by MSC.367(93). Where two compressors are provided, the total required capacity of the system is preferably to be divided equally between the two compressors, and in no case is one compressor to have a capacity less than 1/3 of the total capacity required.

14.3.6 The feed air treatment system fitted to remove free water, particles and traces of oil from the compressed air as required by 2.4.1.2 of Ch.15 of the FSS Code, as amended by MSC.367(93), is also, to preserve the specification temperature.

14.3.7 The oxygen-enriched air from the nitrogen generator and the nitrogen-product enriched gas from the protective devices of the nitrogen receiver are to be discharged to a safe location on the open deck. By the term “safety location” the two types of discharges must be addressed separately:
- oxygen-enriched air from the nitrogen generator - safe locations on the open deck are:
  - outside of hazardous area;
  - not within 3m of areas traversed by personnel; and
  - not within 6m of air intakes for machinery (engines and boilers) and all ventilation inlets.

- nitrogen-product enriched gas from the protective devices of the nitrogen receiver - safe locations on the open deck are:
  - not within 3m of areas traversed by personnel; and
  - not within 6m of air intakes for machinery (engines and boilers) and all ventilation inlets/outlets.

14.3.8 In order to permit maintenance, means of isolation are to be fitted between the generator and the receiver.

14.4 Nitrogen/Inert Gas Systems fitted for purposes other than Inerting Required by SOLAS Req. II-2/4.5.5.1 and 4.5.5.2

14.4.1 This section applies to systems fitted on oil tankers, gas tankers or chemical tankers to which SOLAS regulations II-2/4.5.5.1 and 4.5.5.2 do not apply.

14.4.2 Automatic shutdown of the inert gas system and its components parts shall be arranged on predetermined limits being reached, taking into account the proper function of the indicators and alarms (eg. pressure, oxygen content of inert gas, temperature etc)

14.4.3 The system shall be designed to ensure that if the oxygen content exceeds 5% by volume, the inert gas shall be automatically vented to atmosphere.

14.4.4 Instrumentation shall be fitted for continuously indicating and permanently recording, when inert gas is being supplied:
- the pressure of the inert gas mains forward of the non-return devices;
- the oxygen content of the inert gas.

14.4.6 The indicating and recording devices shall be placed in the cargo control room where provided. But where no cargo control room is provided, they shall be placed in a position easily accessible to the officer in charge of cargo operations.

14.4.7 Audible and visual alarms shall be provided, based on the system designed, to indicate:
- oxygen content in excess of 5% by volume, and
- failure of the power supply to the indicating devices of the pressure of the inert gas mains forward of the non-return devices and the oxygen content of the inert gas, when inert gas is being supplied.

14.4.8 Two oxygen sensors shall be positioned at appropriate locations in the space or spaces containing the inert gas system. If the oxygen level falls below 19%, these sensors shall trigger alarms, which shall be both visible and audible inside and outside the space or spaces and shall be placed in such a position that they are immediately received by responsible members of the crew.

14.4.9 The system shall be provided with one or more compressors to generate enough positive pressure to be capable of delivering the total volume of gas required as follows:
- For inerting empty cargo tanks and maintaining the atmosphere in any part of the tank with an oxygen content not exceeding 8% by volume and at a positive pressure in port and at sea except when it is necessary for such a tank to be gas-free;
- eliminating the need for air to enter a tank during normal operations except when it is necessary for such a tank to be gas-free;
- purging empty cargo tanks of hydrocarbon or other flammable vapours, so that subsequent gas-freeing operations will at no time create a flammable atmosphere within the tank;
- delivering inert gas to the cargo tanks at a rate of at least 125% of the maximum rate of discharge capacity of the ship expressed as a volume. For chemical tankers and chemical/product tankers, the Administration may accept inert gas systems having a lower delivery capacity provided that the maximum rate of discharge of cargoes from cargo tanks being protected by the system is restricted to not more than 80% of the inert gas capacity; and
- delivering inert gas with an oxygen content of not more than 5% by volume to the cargo tanks at any required rate of flow.

14.4.10 A feed air treatment system shall be fitted to remove free water, particles and traces of oil from the compressed air.

14.4.11 The air compressor and nitrogen generator may be installed in the engine-room or in a separate compartment. A separate compartment and any installed equipment shall be treated as an "Other machinery space" with respect to fire protection. Where a separate compartment is provided for the nitrogen generator, the compartment shall be fitted with an independent mechanical extraction ventilation system providing six air changes per hour. The compartment is to have no direct access to accommodation spaces, service spaces and control stations.

14.4.12 Where a nitrogen receiver or a buffer tank is installed, it may be installed in a dedicated compartment, in a separate compartment containing the air compressor and the generator, in the engine room, or in the cargo area. Where the nitrogen receiver or a buffer tank is installed in an enclosed space, the access shall be arranged only from the open deck and the access door shall open outwards. Adequate, independent mechanical ventilation, of the extraction type, shall be provided for such a compartment.

14.4.13 In addition to the requirements in the above mentioned paragraph 14.4.4, instrumentation is to be provided for continuously indicating the temperature and pressure of air at the suction side of the nitrogen generator.

14.4.14 In addition to the requirements in the above mentioned paragraph 14.4.6, audible and visual alarms shall be provided to include:
- failure of the electric heater, if fitted;
- low feed-air pressure or flow from the compressor;
- high air temperature; and
- high condensate level at automatic drain of water separator.

14.4.15 The requirements of the above mentioned section 14.3 apply except paragraphs 14.3.1, 14.3.2, 2.3.3 and 14.3.5.

14.4.16 Materials used in inert gas systems are to be suitable for their intended purpose in accordance with the Rules of the Classification Society.

14.4.17 All the equipment is to be installed on board and tested under working conditions to the satisfaction of the Surveyor.

14.4.18 At least two non-return devices shall be fitted in order to prevent the return of vapour and liquid to the inert gas plant, or to any gas-safe spaces:

14.4.18.1 The first non-return device shall be a deck seal of the wet, semi-wet, or dry type or a double block and bleed arrangement. Two shutoff valves in series with a venting valve in between, may be accepted provided:
- the operation of the valve is automatically executed. Signal(s) for opening/closing is (are) to be taken from the process directly, e.g. inert gas flow or differential pressure; and
- alarm for faulty operation of the valves is provided, e.g. the operation status of "blower stop" and "supply valve(s) open" is an alarm condition.

14.4.18.2 The second non-return device shall be a non-return valve or equivalent capable of preventing the return of vapours and liquids and fitted between the deck water seal (or equivalent device) and the first connection from the inert gas main to a cargo tank. It shall be provided with positive means of closure. As an alternative to positive means of closure, an additional valve having such means of closure may be provided between the non-return valve and the first connection to the cargo tanks to isolate the deck water seal, or equivalent device, from the inert gas main to the cargo tanks.

14.4.19 Where the connections to the cargo tanks, to the hold spaces or to cargo piping are not permanent, the non-return devices required by the above mentioned paragraph 14.4.17 may be substituted by two non-return valves.

14.5 Annual Surveys-Oil tanker gas system survey

14.5.1 For the inert gas systems of cargo ships, concerning the additional requirements for tankers the annual survey should consist of:

14.5.1.1 examining the inert gas system, and in particular:
- examining externally for any sign of gas or effluent leakage;
- confirming the proper operation of both inert gas blowers;
- observing the operation of the scrubber-room ventilation system;
- checking the deck water seal for automatic filling and draining;
- examining the operation of all remotely operated or automatically controlled valves and, in particular, the flue gas isolating valves;
- observing a test of the interlocking feature of soot blowers;
- observing that the gas pressure regulating valve automatically closes when the inert gas blowers are secured;
- checking, as far as practicable, the following alarms and safety devices of the inert gas system using simulated conditions where necessary:
  - high oxygen content of gas in the inert gas main;
  - low gas pressure in the inert gas main;
  - low pressure in the supply to the deck water seal;

- high temperature of gas in the inert gas main;
- low water pressure or low water-flow rate;
- accuracy of portable and fixed oxygen-measuring equipment by means of calibration gas;
- high water level in the scrubber;
- failure of the inert gas blowers;
- failure of the power supply to the automatic control system for the gas regulating valve and to the instrumentation for continuous indication and permanent recording of pressure and oxygen content in the inert gas main;
- high pressure of gas in the inert gas main;

14.5.1.2 checking, when practicable, the proper operation of the inert gas system on completion of the checks listed above

14.6 Annual Surveys - Gas carrier inert system survey

14.6.1 Confirming that arrangements are made for sufficient inert gas to be carried to compensate for normal losses and that means are provided for monitoring the spaces,

14.6.2 Confirming that the use of inert gas has not increased beyond that needed to compensate for normal losses by examining records of inert gas usage,

14.6.3 Confirming that any air-drying system and any interbarrier and hold space purging inert gas system are satisfactory.

14.7 Special Surveys

14.7.1 For the gas inert system of cargo ships, concerning the additional requirements for tankers the renewal survey should consist of:

14.7.1.1 the provisions of 14.5.1;

14.7.1.2 examining the deck water seal for the inert gas system internally and checking the condition of the non-return valve

Section 15 – Surveys of vessels with refrigerated cargo installations

15.1 General

15.1.1 Refrigerated cargo installation on ships assigned the character RC are to be surveyed periodically as given in [Section.1 of this Chapter].

15.1.2 Where these installations hold dual classification with DBS, additional Periodical Survey requirements, if any, of the corresponding Society would also be applicable.

15.2 Periodical surveys

15.2.1 A Special Survey is to be held at five (5) years intervals. When due to special circumstances, a Special Survey is initiated before its due date, the Survey is to be accomplished within a period not exceeding 9 months and not later than the expiry date of the classification certificate including any postponement that may be granted by DBS.

15.2.2 If classification certificate expires and the ship is not in a port in which it is to be surveyed, Owners may request DBS to extend the validity of the classification certificate for a period not exceeding 3 months. Such requests will only be considered so that ship can complete its voyage to the port of survey and only where it is appropriate and reasonable.

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15.3 Continuous special survey of refrigerating installation

15.3.1 Upon Owner's request and upon receipt of a satisfactory proposed arrangement, DBS may consider a system of Continuous Survey of refrigerating installation (CS HY) and execute it whereby the requirements of Special Surveys as detailed in [15.5 and 15.6] are completed within a five (5) year period. In such cases, various items of machinery should be opened for Survey in rotation, as much as feasible, to ascertain that the interval between subsequent examinations does not exceed five (5) years and that approximately an equal proportion of the surveyable items would be subjected to survey each year.

15.3.2 At Surveyor's discretion, if any defects are revealed during these examinations, further parts may have to be opened and examined.

15.4 Annual survey requirements

15.4.1 To ascertain that installations have been working properly and efficiently, log books or other records are to be examined. If some proofs of breakdowns or defects, during the previous 12 months, are indicated, they are to be noted and reported. When feasible, the refrigerating plant is to be examined right at the arrival of the ship at the port of discharge prior to unloading of refrigerated cargo.

15.4.2 Examination of refrigerated chambers/holds and spaces are to begin after careful cleaning and that is supposed to be very detailed. For the same, removable panels and covers are to be removed and if appropriate, spot checks of the insulation are to be performed for condition and shrinkage. If there is trace of damp or leakage of the insulation from any source viz. fuel tank, pipe work, pipe coils, scuppers, etc. or in the insulation or its lining of the air ducts or air coolers, thorough examination is to be done and required remedial measures taken to correct the defects.

15.4.3 Where the cargo is refrigerated by circulating air, the air tightness of the air ducts, air cooler casings, hatch covers, doors, butterfly dampers in ventilation ducts etc. are to be checked and so also the insulation of the lining joints.

15.4.4 The Surveyor should be satisfied that the bilges are cleaned and all scuppers draining the chambers and cooler traysare in proper working condition. Also, suction pipes, sounding pipes and scupper non-return valves are to be examined.

15.4.5 Cooling grids, air cooler coils and valves are to be examined and the Surveyor should be satisfied that no pipe is partially or completely choked and that the valves are in proper working condition.

15.4.6 Brine coils are to be examined whilst under a pressure of 1.5 times working pressure or 3 bar whichever is greater.

15.4.7 Grids and primary refrigerant cooler coils are to be examined whilst under the refrigerant pressure prevailing in the system at the time of the Survey with the plant at rest and the regulating valves opened just adequate to obtain an approximate balance of pressure throughout the system and to avoid accumulation of liquid in the grids or coils.

15.4.8 The shells of evaporators, condensers, separators, receivers, and other pressure vessels are to be examined. Any proof of excessive corrosion of water end covers of "shell and tube" and "double-pipe" type condensers is found, than it is to be probed.

15.4.9 Primary refrigerant gas and liquid pipes, valves and condenser cooling water piping are to be examined.

15.4.10 Any evidence of dampness or deterioration of the insulation which could lead to external corrosion of the ships or other parts mentioned is to be probed and required corrective measures are to be taken to correct the defects.

15.4.11 Examination of the fans, their motors, control gear is to be made and the insulation resistance is to be measured and shall not less than 100,000 ohms. The generating plant supplying electric power is to be examined to ascertain that the plant is being efficiently maintained.

15.4.12 The thermometers for measuring the chamber air suction and air delivery temperatures are to be examined. If renewals and changes are made, the thermometers are to be checked for accuracy.

15.4.13 Onboard the ship, a survey book or other permanent record is to be kept to show the date of examination of various parts. This is to be readily available to the Surveyor always and is to be signed by the Surveyor every time after the survey.

15.5 Requirements of first Special Survey

15.5.1 Each reciprocating compressor, including those provided for sub-cooling the primary refrigerant, is to be opened and examination of the cylinder bores, pistons, piston rods, connecting rods, valves and seats, glands, relief devices, suction filters and lubricating arrangements are to be done. Crankshafts are to be examined, but if the Surveyor is satisfied with the alignment and wear of the crankcase glands and the lower halves of main bearings, they need not be exposed.

15.5.2 For screw-type compressors, the time before opening up may be extended to 6 years or 25000 running hours, whichever comes first.

15.5.3 Where there is a replacement programme instead of surveys on board, alternative survey arrangements will be considered and each case will be given individual consideration.

15.5.4 Refrigerant condenser cooling water pumps, including standby pump(s) used another services are to be opened such that their working parts are exposed.

15.5.5 Brine and primary refrigerant pumps are to be opened such that their working parts are exposed. The survey requirements for primary refrigerant pumps of the hermetically sealed type are specially considered.

15.5.6 The water end covers of "shell and tube" and "double-pipe" type condensers are not included during examination of the tubes, tube plates and covers.

15.5.7 The shells and connections of "shell-and-tube" and "double-pipe" type condensers and evaporators, separators, receivers, driers, filters and other pressure vessels, and the coil terminals of "coil-in-casing" type condensers and evaporators, are to be examined, as feasible.

15.5.8 For pressure vessels covered by insulation, any proof of deterioration of the insulation that could cause external corrosion of the ships or their connections, is to be probed.

15.5.9 Adequate insulation is to be stripped from insulated pressure ships for ascertaining the condition of the ships and their connections. During replacement of the insulation, the vapour sealing of the outer covering is carefully handled.

15.5.10 Adequate insulation is to be stripped from pipes at various points of the system both outside and inside the insulated chambers that carry the refrigerant to ascertain the condition of the pipes. Exposed sections of piping are to include locations where lengths of piping have been connected by screwed couplings or butt welding. The ungalvanized portions of the piping in way of joints that have been exposed shall be carefully and suitably coated and taped, after pressure testing, to prevent corrosion. After replacement of the insulation, the vapour sealing of the outer covering is to be carefully corrected.

15.5.11 The Surveyor shall be satisfied that all pressure relief valves and/or safety discs in refrigerating plant are functioning properly. However, testing primary refrigerant pressure relief valves on board ship shall not be attempted.

15.5.12 Sea connections to refrigerant condensers cooling water pumps are to be opened during hull and/or main machinery Special Survey.

15.5.13 The insulation resistance of electric motors that run refrigerant compressors, pumps and fans and their control gear and cables, are to be tested and this is to be not less than 100000 ohms between all insulated circuits and earth. The installation may be sub-divided to desired extent by opening switches, removing fuses or disconnecting appliances during this test.

15.5.14 The fittings on switchboards and section boards are to be examined besides the over-current protective devices and fuses to verify that they have suitable protection for their respective circuits.

15.5.15 To ensure that the circuits for cargo refrigerating machinery are included in the last group to be disconnected, any arrangements that are fitted to automatically disconnect the excess non-essential load when the electrical generators are overloaded are to be examined.

15.5.16 All alarms and automatic controls are to be tested.

15.5.17 To ascertain the condition of the insulation, insulation linings, grounds, supports, hangers and fixtures which support the insulation, grids, meat rails, etc., adequate air trunking and insulation lining is to be stripped from the chamber's overhead and vertical surfaces. Replacement shall be done taking care that the ducts and linings are sealed against air blowing into the insulation, or against moisture ingress from refrigerated cell or space atmosphere.

15.5.18 To ascertain the condition of the grounds and inner insulation lining, adequate tank top insulation is to be stripped.

15.5.19 When determining the amount of insulation lining to be removed as detailed in [15.5.17 and 15.5.18, due consideration is to be given to the type of insulation used in the holds and chambers. In places where organic foam insulants including foamed "in situ", or other insulants in slab form have been used, at Surveyor's discretion, the removal of linings using test bore holes is done so that the condition of the insulation remains good.

15.5.20 Under normal circumstances, when the Special Survey of the ship's steel structure is being executed, the condition of hold and chamber insulation, grounds, etc., can be ascertained.

15.5.21 Arrangements made for defrosting air coolers, and for draining condensate from trays below coolers, are to be examined to ensure that they are properly functioning.

15.5.22 Any air refreshing arrangements are to be probed.

15.6 Subsequent Special Surveys

15.6.1 In addition to the requirements for first Special Survey, the underlying items, as stated in [Table 15.1] are to be tested and examined.

15.7 Loading Port Surveys

At the loading port, upon Owner's or his authorised representative's request, a Loading Port Survey, as given below, is to be executed.

15.7.1 For ships that are on voyages for less than two months time, a loading port certificate is valid for two months, provided the cargoes they carry are such that they do neither damage the insulation or appliances in the insulated chambers, nor affect by taint or mould, the loaded refrigerated cargoes.

15.7.2 If a ship loads cargo at more than one port, Loading Port Survey at the first loading port would only be required, provided all the chambers loaded with refrigerated cargo are probed and no general cargo is loaded in these chambers later and prior to loading of refrigerated cargo.

15.7.3 The empty refrigerated cargo spaces are to be examined that is prior to loading the cargo. The Surveyor shall be satisfied with their cleanliness and be assured that they are free from odour which may adversely affect the cargo to be loaded. There shall be no leakage in brine or other refrigerant pipe grids, cooler coils and connections. The Surveyor shall also be satisfied that the fixed cargo battens on the vertical surfaces are in good order, that cargo gratings or dunnage battens are provided for the floors or decks and that no damage has been caused to the insulation or its lining before the loading of the refrigerated cargo.

15.7.4 If there is found any indication of defective insulation that does not need urgent attention should be specially noted and reported.

15.7.5 The bilges and scuppers in the refrigerated cargo spaces are to be clean and dry and the liquid seals should be primed.

15.7.6 The operations of entire refrigerated cargo installation will be checked by the Surveyor who also keeps record of the temperatures in the cargo spaces.

15.7.7 The proper operation of air duct couplings for connecting refrigerated containers on the ship's own refrigerating installation has to be examined. If refrigerated containers are coupled to the air ducts during the on board survey, the tight sealing effect of the couplings is also to be checked.

15.7.8 The certificate issued for the executing a Loading Port Survey is clearly not in respect to the loaded cargo or the manner in which it is to be stowed.

Item	**Dichlorodifluoro-methane (R12)**	**Ammonia(NH3) or Monochlorodifluoro-methane R22)**	**Carbon dioxide (CO2)**
"Shell and tube" type gas condensers or gas evaporators (brine coolers) (primary refrigerant in the shell)	7bar	14bar	-
	Water or brine end covers to be removed and shell pneumatically tested with the refrigerant or air or a mixture of inert gas and refrigerant to the above pressures		
"Coilin casing" type gas condensers	17 bar	70 bar	140 bar
	Where it is impracticable to remove the coils they may be examined and tested in place		
"Coilin casing" type gas evaporators (brine coolers)	14bar	35bar	105 bar
	Where it is impracticable to remove the coils they may be examined and tested in place		
Primary refrigerant chamber grids or air Cooler coils	7bar	10bar	70 bar
"Shell and tube" type gas evaporators (brine coolers) (brine is in the shell)	Primary refrigerant end covers are to be removed and tested		
	Shell to be hydraulically tested to twice the design pressure but not less than 3 bar		

Table 15.1: The requirements of special surveys

Section 16 – Surveys for the vapour control systems

16.1 For tankers and combination carriers with notation VCS1

16.1.1 Annual Surveys
The vapour emission control system is to be examined to ensure its condition at each Annual Survey. The survey is to include:

16.1.1.1 Components and piping
External examination of these including isolating / relief valves, means of collecting and draining condensate and separating vapours from non-compatible cargoes and electrical continuity / bonding arrangements.

16.1.1.2 Manifold isolating valve.
Ascertaining that the vapour manifold isolating valve and its manual operation is proper.

16.1.1.3 Vapour connection flanges
Confirmation of the continuing effectiveness of the “lug and hole” construction of the vapour connection flange(s), or other approved means of preventing misconnection of the loading hose to the vapour collection system.

16.1.1.4 Hoses
Confirmation that any hose used for the conveyance of vapour are as specified in [Part.8, of DBS rules].

16.1.1.5 Inert gas distribution piping
Where it is used for vapour collection, checking the effectiveness of the inert gas main isolating valve(s).

16.1.1.6 Cargo gauging system
Correct operation of these for each tank, which is connected to the vapour collection system. Where portable gauging devices are used, the number of devices available is to be equal to the number of tanks that can be loaded plus two (2) additional units.

16.1.1.7 Cargo tank venting system
Examination of this system including flame screens, where fitted.

16.1.1.8 Alarms and safety devices
Ascertaining the satisfactory operation of the alarms and safety devices using simulated conditions, where required.
- Low vapour pressure in main vapour collection line(s) (not applicable to tank barges).
- High vapour pressure in main vapour collection line(s) (not applicable to tank barges).
- Cargo tank high liquid level.
- Cargo tank overfill (high-high liquid level), where fitted.
- Loss of power to alarm system or, alternatively, failure of tank level sensor circuitry.
- Automatic shutdown system, where fitted.

16.1.1.9 Operation and maintenance records
- Examination of the permanent records to verify the satisfactory operation and maintenance of the system.
- Surveyor may consider that certain items are functioning satisfactorily and their operation has been properly documented and recorded.

16.1.2 Special surveys
At each Machinery Special Survey, the underlying items of the vapour emission control system are to be examined; in addition to the above requirements of Annual Survey:

16.1.2.1 Valves
All valves, including cargo tank isolating valves, main vapour line cross-over valves (where fitted for vapour segregation), condensate drain valves, manifold isolating valves, pressure / vacuum relief valvesand spill valves / rupture disks (where fitted as additional overfill control devices).

16.1.2.2 Gauging system
The closed gauging system including portable gauging devices, where fitted.

16.1.2.3 Alarms
The independent cargo tank overfill alarms, where fitted.

16.1.2.4 Hoses
Vapour collection system hoses for electrical continuity or non-conductivity, as applicable.

16.1.2.5 Inert gas distribution piping
The inert gas distribution piping used for vapour collection, deck seals or double block and bleed assemblies.

16.2 For tankers and combination carriers with notation VCS2

16.2.1 Annual surveys
At each Annual Survey, in addition to the requirements of [16.1.1], the underlying items of the vapour emission control system are to be examined:

16.2.1.1 Detonation flame arrester
The detonation flame arrester (where fitted).

16.2.1.2 Vapour manifold
Ascertaining that means of electrical insulation (insulating flange or non-conductive hose, etc.) is provided for the vapour manifold connection.

16.2.1.3 Fixed oxygen analyzer
Ascertaining of the precision of the fixed oxygen analyzer (required to be fitted within 3 [m] (10 feet) of the ship's vapour manifold connection) by means of a calibration gas.

16.2.1.4 Vapour blowers / compressors
Any devices (such as compressors or blowers) that are used to increase the vapour flow rate.

16.2.2 Special surveys
At each Machinery Special Survey, in addition to the requirements of [16.1.2 and 16.2.1], the underlying items of the vapour emission control system are to be examined:

16.2.2.1 Vapour Blowers / Compressors and detonation flame arresters
Vapour blowers / compressors and detonation flame arresters including isolating and relief valves, where fitted and as applicable.

Section 17 – Surveys of Thermal Oil Heating Systems

17.1 General

17.1.1 Thermal Oil Heating systems are to be surveyed at survey intervals specified in [Sec.1,] of this Chapter.

17.1.2 At each survey, the underlying components are to be examined:

- Oil fired thermal oil heater/s and Economiser/s including the heat exchanger coils, insulation and fuel oil burning arrangement are to be examined externally
- Circulating pumps
- Dump cooler
- Piping arrangement including control valves and insulation
- Expansion tank and temperature blocking pipe
- Alarms and safety devices −Thermal oil (analysis results).

17.2 Oil fired thermal oil heater and Economiser

17.2.1 These are to be externally examined to check the condition of the insulation, cleanliness and their attachment to the ship's structure.

17.2.2 Heat exchanger coils are to be examined to ascertain that there are no signs of overheating or corrosion and that they are in a state to do heat exchange properly.

17.2.3 Heat exchanger coils are subjected to a leakage test, at working pressure and with working fluid.

17.2.4 All mountings are to be externally and internally examined at the discretion of the Surveyor.

17.2.5 Fuel oil burning arrangements are to be examined for proper operation, also during safety cut-outs.

17.3 Circulating pumps

Circulating pumps are to be examined externally and internally at Surveyor's discretion to check that they are properly operating even during automatic change over.

17.4 Dump cooler

Dump coolers including pressure relief devices are to be examined externally and internally.

17.5 Piping arrangement

17.5.1 Complete piping arrangement including condition of insulation is to be externally examined and tested for any leaks.

17.5.2 At Surveyor's discretion, pipe fittings and valves are to be examined externally and internally.

17.6 Expansion tank

17.6.1 Expansion tank including associated save-alls is to be visually examined.

17.6.2 To check and examine the arrangement to limit the temperature of thermal oil in the expansion tanks (in open vent systems) such as 'Temperature Blocking Pipe".

17.6.3 To check and examine the operation of de-aeration arrangement and vent.

17.7 Alarms and safety devices

Underlying alarms and safety devices are to be tested:

17.7.1 Thermal oil high temperature alarm and safety cut out (both in oil fired heater and economiser)

17.7.2 Minimum flow control device, alarm and safety cut out (both in oil fired heater and economiser)

17.7.3 Flue gas high temperature alarm and safety cut out (both in oil fired heater and economiser)

17.7.4 Expansion tank low level and low-low level alarm and safety cut out

17.7.5 Thermal oil leakage alarm and safety cut out (both in oil fired heater and economiser)

17.7.6 Fire Extinguishing arrangements.

17.8 Thermal oil analysis

Thermal oil is to be analysed at regular intervals or annually and shall be free from harmful contaminants and signs of oxidation or deterioration.

17.9 System operation test

On completion of survey, the entire system is to be examined under working conditions especially any signs of leakage and functioning of control and safety devices.

17.10 Repairs

17.10.1 Any defects to alarms and safety devices the proper operation of which may pose a fire risk are to be promptly repaired in presence of the Surveyor.

17.10.2 When system parts or components are changed or repaired, these are to be subjected to a pressure test to 1.5 times the working pressure before putting back into service.

Section 18 – Surveys of external firefighting systems

18.1 General

18.1.1 At intervals specified in Section 1 of this chapter, external Fire Fighting Systems on ships to be surveyed as follows.

18.2 Annual surveys

18.2.1 For the firefighting systems of cargo ships the annual survey should consist of:

18.2.1.1 examining the fire pumps, fire main, hydrants, hoses and nozzles and the international shore connection and checking that each fire pump, including the emergency fire pump, can be operated separately so that two jets of water are produced simultaneously from different hydrants at any part of the ship whilst the required pressure is maintained in the fire main

18.2.1.2 checking the provision and randomly examining the condition of the portable and non-portable fire extinguishers

18.2.1.3 confirming that the firefighters' outfits including its self-contained compressed air breathing apparatus and emergency escape breathing devices (EEBDs) are complete and in good condition, that the cylinders, including the spare cylinders, of any required self-contained breathing apparatus are suitably charged, and that on board means of recharging breathing apparatus cylinders used during drills or a suitable number of spare cylinders to replace those used are provided, and provision of two-way portable radiotelephone apparatus of an explosion-proof type or intrinsically safe.

18.2.1.4 checking the operational readiness and maintenance of firefighting systems

18.2.1.5 examining the fixed firefighting system for the machinery, cargo, vehicle, special category and ro-ro spaces, as appropriate, and confirming that its means of operation is clearly marked

18.2.1.6 examining the fire-extinguishing and special arrangements in the machinery spaces and confirming, as far as practicable and as appropriate, the operation of the remote means of control provided for the opening and closing of the skylights, the release of smoke, the closure of the funnel and ventilation openings, the closure of power operated and other doors, the stopping of ventilation and boiler forced and induced draft fans and the stopping of oil fuel and other pumps that discharge flammable liquids

18.2.1.7 checking that fixed carbon dioxide fire-extinguishing systems for the protection of machinery spaces and cargo pump-rooms, where applicable, are provided with two separate controls, one for opening of the gas piping and one for discharging the gas from the storage container, each of them located in a release box clearly identified for the particular space

18.2.1.8 examining, as far as possible, and testing, as feasible, any fire detection and alarm system and any sample extraction smoke detection system

18.2.1.9 examining the fire-extinguishing systems for spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces

18.2.1.10 examining the helicopter facilities

18.2.1.11 examining the arrangements for remote closing of valves for oil fuel, lubricating oil and other flammable oils and confirming, as far as practicable and as appropriate, the operation of the remote means of closing the valves on the tanks that contain oil fuel, lubricating oil and other flammable oils

18.2.1.12 examining and testing of the general emergency alarm system

18.2.1.13 examining the fire protection arrangements in cargo, vehicle and ro-ro spaces and confirming, as far as practicable and as appropriate, the operation of the means of control provided for closing the various openings

18.2.1.14 examining, where applicable, the alternative design and arrangements for fire safety or life-saving appliances and arrangements, in accordance with the test, inspection and maintenance requirements, if any, specified in the approved documentation

18.2.1.15 examining, when appropriate, the special arrangements for carrying dangerous goods, including checking the electrical equipment and wiring, the ventilation, the provision of protective clothing and portable appliances and the testing of the water supply, bilge pumping and any water spray system

18.2.2 For the life-saving appliances and the other equipment of cargo ships, concerning the additional requirements for tankers the annual survey should consist of:

18.2.2.1 checking the deck foam system, including the supplies of foam concentrate and testing that the minimum number of jets of water at the required pressure in the fire main is obtained when the system is in operation

18.2.2.2 examining the fixed firefighting system for the cargo pump rooms and confirming, as far as practicable and when appropriate, the operation of the remote means for closing the various openings;

18.2.2.3 checking for all tankers, the provision of at least one portable instrument for measuring oxygen and one for measuring flammable vapour concentrations, together with a sufficient set of spares, and suitable means for the calibration of these instruments

18.2.2.4 checking temperature sensing devices for bulkhead glands and alarms

18.3 Periodical surveys

18.3.1 For the life-saving appliances and the other equipment of cargo ships the periodical survey should consist of the provisions of 18.2 and in addition the following:

18.3.1.1 confirming, during the examination of the fixed firefighting system for the machinery, cargo, vehicle, special category and ro-ro spaces, that, as appropriate, any foam compounds and the CO2 capacity have been checked and that the distribution pipework has been proved clear

18.3.1.2 testing the operation of the remote means of control provided for the opening and closing of the skylights, the release of smoke, the closure of the funnel and ventilation openings, the closure of power operated and other doors, the stopping of ventilation and boiler forced and induced draft fans and the stopping of oil fuel and other pumps that discharge flammable liquids

18.3.1.3 testing any fire detection and alarm system and any sample extraction smoke detection system

18.3.1.4 testing, as feasible, the fire-extinguishing system for spaces containing paint and/or flammable liquids and deep-fat cooking equipment in accommodation and service spaces

18.3.1.5 testing the remote closing of valves for oil fuel, lubricating oil and other flammable oils and the operation of the remote means of closing the valves on the tanks that contain oil fuel, lubricating oil and other flammable oils

18.3.1.6 testing the operation of the means of control provided for closing the various openings for the cargo, vehicle, special category and ro-ro spaces.

18.3.2 For the firefighting equipment for the additional requirements for tankers the periodical survey should consist of:

18.3.2.1 the provisions of 18.2.2

18.3.2.2 confirming during the examination of the fixed firefighting system for the cargo pump rooms that, as appropriate, any foam compounds have been checked and that the distribution pipework has been proved clear and checking the operation of the remote means for closing the various openings.

18.4 Renewal Survey

18.4.1 For the life-saving appliances and the other equipment of cargo ships the renewal survey should consist of the provisions of 18.3.1.

18.4.2 For the firefighting equipment for the additional requirements for tankers the renewal survey should consist of the provisions of 18.3.2

Section 19 – Survey Requirements for Additional Systems and Services

Crew Habitability on Ships

19.1 Annual Surveys

The information given below is to be reviewed by the attending Surveyor as these issues could possibly affect the Habitability notation.

a) Ship's log and Chief Engineer's log since the previous Initial, Annual or Special Periodical Survey
b) Collision and grounding reports since the previous Initial, Annual or Special Periodical Survey
c) Fire, repair and damage reports since the previous Initial, Annual or Special Periodical Survey
d) A list of all amendments made to the ship since the previous Initial, Annual or Special Periodical Survey
e) Validation that equipment and facilities of the ship are fit for purpose and are in proper operating condition and as per the Accommodations Criteria stated within the DBS Rules Part 12.
f) Validation that the geographical area of ship operations has not altered since the previous Initial, Annual or Special Periodical Survey.
    - While the Surveyor reviews the submitted information, a determination will be made as to whether changes or alterations that have taken place could affect the Habitability notation. Consequently, the ship may be subject to the review, ambient environmental testing and inspection requirements of the Part 12.

19.2 Special Periodical Surveys

19.2.1. Special Periodical Survey Number 1 (Age ≤ 5 Years)

The Survey is to be composed of engineering reviews, Surveyor's verifications and ambient environmental testing. The Survey will cover all five (5) habitability aspects. The underlying information is to be submitted to the DBS Technical Office before three (3) months the ambient environmental testing is done:

a) Collision and grounding reports since the previous Annual Survey
b) Fire, repair or damage reports since the previous Annual Survey
c) A list of all amendments made to the ship since the previous Annual Survey
d) Any change in the geographical area of ship operations since the Initial Survey
e) Any drawings/arrangements of crew spaces, HVAC, electrical, etc. affected by those amendments
f) Copy of approved Test Reports and Initial Test Plans
g) Test Plans and Test Reports of Annual Surveys
h) Previous Special Periodical Survey Test Plans and Reports, if applicable
i) Proposed Special Periodical Survey Test Plans for the current survey

The submitted data of Special Periodical Survey serves three purposes. The first is to perform an engineering review of crew spaces against any alterations to the vessel since the Initial Survey, with measurements verified by a Surveyor. The second purpose is to provide a history of ambient environmental testing, aswell as the Special Periodical Survey ambient environmental test plans for review and approval. The third is to allow scheduling of measurement verifications and ambient environmental testing.

A Special Periodical Survey Test Plan for each ambient environmental aspect of Habitability is to be submitted in accordance with the criteria stated below. The approved Initial Test Plans can be used as a basis for creating the Special Periodical Survey Test Plans.

For creation of the Special Periodical Survey Test Plans, Subsection, "Test Plan", and Subsection, "Test Requirements", of Chapters 3 through 6 of Part 12 specify the requirements for each ambient environmental aspect (i.e., 3.2.1,4.2.1,5.3.1, 6.2.1 , etc.). For specifying measurement locations for the Special Periodical Survey Test Plans, the following changes to Subparagraph, "Selection of Spaces where Measurements are to be Conducted", of each ambient environmental aspect of Habitability are to be followed:

Measurements shall be taken in all areas affected by ship alterations. Measurements would be restricted to the ambient environmental aspect affected by the alteration. For example, structural changes would require both vibration and noise measurements. Structural changes would not necessarily require indoor climate or lighting measurements. Changes to luminaries would require lighting measurements but not vibration, noise or indoor climate measurements.

i) Measurements shall be taken in all worst case or problem area locations. Worst case or problem area locations for a particular ambient environmental aspect shall be selected based on the requirements set forth in Subparagraph, "Selection of Spaces where Measurements are to be Conducted", of the appropriate section of the Part 12.

ii) For whole-body vibration, additional measurements shall be taken in crew cabins and staterooms throughout the vessel. For vessels with fewer than one hundred (100) crew cabins and staterooms, ten (10) % of cabins and staterooms shall be measured.

For vessels with one hundred (100) or more crew cabins and staterooms, apply the following:

- In the forward one-third (1/3) of the vessel, three (3) % or 1 in 33 of cabins and staterooms shall be measured.
- In the midsection (center 1/3) of the vessel, two (2) % or 1 in 50 of cabins and staterooms shall be measured.
- In the aft one-third (1/3) of the vessel, five (5) % or 1 in 20 of the cabins and staterooms shall be measured.

Within each one-third (1/3) section of the vessel, measurement locations shall be distributed throughout the length of each section and on each deck.

iii) Regardless of the number of crew cabins and staterooms on a vessel, attention must be given to selecting a variety of locations port, starboard, fore, amidships and aft. The worst-case locations can be considered part of the representative sample for crew cabins and staterooms, if applicable.

iv) For whole-body vibration, additional measurements shall also be taken in crew living and working spaces other than crew cabins and staterooms. Where a single instance of one (1) type of manned crew space exists within the vessel (e.g., bridge, radio room, officer's mess, gymnasium, library, etc.), that location shall be selected for measurement. Where multiple instances of manned crew recreational spaces exist, a representative sample of at least ten (10) % of each type shall be selected for measurement. The worst-case locations are to be considered part of the representative sample, if applicable.

v) If any of the spaces identified for measurement extend or are situated over a large portion of the vessel, measurement locations shall be selected throughout the length of the vessel and on each deck.

vi) Additionally, attention must be given to selecting a variety of locations port, starboard, amidships, fore and aft.

vii) For noise, indoor climate and lighting, where a single instance of a crew space exists, a representative sample of at least ten (10) % of these spaces shall be selected for measurement.

viii) The worst-case locations can be considered part of the single instance representative sample, if applicable.

ix) For noise and indoor climate, where multiple instances of a crew space exist, a representative sample of at least ten (10) % of these spaces shall be selected for measurement.

x) The worst-case locations can be considered part of the multiple instance representative sample, if applicable.

xi) For lighting, select a sample of at least ten (10) % of spaces where crew are involved in recreational activities (e.g., mess rooms or recreation areas) for measurement. Where a number of cabins, staterooms and sanitary spaces are identical in configuration in terms of lighting systems, surface treatments, geometry, furnishings and equipment layout, only two (2) of the spaces shall be selected to determine whether the lighting requirements are met. A sample of at least fifteen (15) % of the remaining spaces shall be visually inspected. The worst-case locations can be considered part of these lighting representative samples, if applicable. For all ambient environmental conditions, visual inspections are to be conducted.

19.2.2. Special Periodical Survey Number 2 (5 Years < Age ≤ 10 Years)

The Survey is to be comprised of engineering reviews, Surveyor verifications and ambient environmental testing. The Survey will cover all five (5) habitability areas and will follow the same procedures and requirements as the Initial Survey, except that for the drawing and information submittals stated here.The following is to be submitted to an DBS Technical Office three (3) months prior to doing the ambient environmental testing:

a) Collision and grounding reports since the previous Annual Survey
b) Fire, repair and damage reports since the previous Annual Survey
c) A list of all amendments to the ship since the previous Annual Survey
d) Notice of any change in the geographical area of vessel operations since the previous Initial, Annual or Special Periodical Survey
e) Any drawings/arrangements of crew spaces, HVAC, electrical, etc. affected by alterations
f) Copy of the approved Initial Test Plans and Reports
g) Test Plans and Test Reports resulting from Annual Surveys
h) Previous Special Periodical Survey Test Plans and Reports
i) Proposed Special Periodical Survey Test Plans for the current survey

The Special Periodical Survey data submittal serves three purposes. The first is to perform an engineering review of crew spaces against any alterations to the ship since the initial and subsequent Special Periodical Surveys, with measurements validated by a Surveyor. The second purpose is to give a historyof ambient environmental testing as well as new Special Periodical Survey ambient environmental testing plans for review and approval. The third is to allow scheduling of verification measurements and ambient environmental testing.

A Special Periodical Survey Test Plan for each ambient environmental aspect of habitability is to be submitted as specified in Subsection, "Test Plans" and Subsection, "Test Requirements" of the appropriate ambient environment section. The Test Plan is to include the same procedures and requirements as the Initial Survey with the following addition. Measurement locations will be specified for spaces where ship alterations have occurred or where such alterations may affect the ambient

environmental aspects related with a space. Despite of that, the approved Initial Test Plans can be used as a basis for creating thenew Special Periodical Survey Test Plans.

19.2.3. Special Periodical Survey Number 3 (10 Years < Age ≤ 15 Years)
The Survey is to follow the procedures and requirements similar to that described in 19.2.2.

19.2.4. Subsequent Special Periodical Surveys (Age > 15 Years)
The Survey is to follow the procedures and requirements similar to that described in 19.2.2.

19.3 Requirements for Ship Alterations

No changes which affect or may affect the Habitability notation (**ACCOM** or **ACCOM+**), including amendments to the structure, machinery, electrical systems, piping, furnishings or lighting systems, are to be made to the ship unless plans of the proposed alterations are submitted and approved by an DBS Technical Office before the work is initiated. If the DBS Technical Office determines that the change will affect the Habitability notation, the altered ship is to be subject to the review, verification and ambient environmental testing requirements of the Part 12.

19.4 Requirements for Geographical Area of Ship Operations

When the intention is to change the geographical area of ship operations, it may affect the Habitability notation (**ACCOM** or **ACCOM+**) and the details of such a change are to be submitted to the DBS Technical Office for review. If the review by the DBS Technical Office determines that the change will affect the Habitability notation, the vessel is to be subject to the review and ambient environmental testing requirements.

Section 20 – Surveys for electrical equipment

20.1 General

20.1.1 The hereunder recommendations covers factors directly related to the maintenance and inspection of the electrical equipment fitted to the main switchboards, propulsion switchboards, emergency switchboards and section boards.

20.1.2 These rules do not replace the maintenance planning recommended by the manufacturers but should be considered in the ship's maintenance scheme.

20.1.3 The maintenance and inspection operations should be recorded, identifying the examined equipment, obtained results, and any possible investigations and corrections.

20.1.4 The complete maintenance and inspection operations should be arranged according to Table 1 and be co-ordinated with the periodical surveys of the vessel.

20.2 Definitions

20.2.1 Inspection: An action comprising scrutiny of an item carried out with or without dismantling as required, supplemented by means such as measurement, in order to arrive at a reliable conclusion as to the condition of this item.

20.3 Qualification of the personnel

20.3.1 The maintenance and inspection of installations should be carried out by personnel whose training has included instruction on the various types of installations (e.g. verification of medium voltage systems, dynamic positioning systems and other new electrical systems), relevant rules and regulations and on personnel safety.

20.3.2 Qualified personnel responsible for inspection and maintenance works should be appointed by owners and builders, in accordance with the applicable rules and regulations.

20.4 Survey of electrical equipment installed in hazardous areas on tankers

20.4.1 Maintenance procedures and records for all electrical equipment located in hazardous areas are documented and kept onboard. The record includes the following as a minimum:
- Date of inspection
- Identification of any maintenance found necessary
- Details of maintenance and date when it was completed
- Name of companies and persons who carried out the inspection and maintenance

20.4.2 The maintenance record, is to be reviewed for updates carried out the last 12 months. Repaired or replaced Ex equipment is to be surveyed by checking connections, conditions and function including opening enclosures by appropriate tools, including updated document (Refer IEC 60079-17).

20.4.3 Electrical equipment in gas-dangerous spaces and zones are to be examined with respect to:
- The enclosure is in satisfactory condition.
- No unauthorised modifications
- Bolts of the enclosure are tight and in satisfactory condition.
- There are no strains, poor insulation /or loosen connection to the electrical equipment in the enclosure.
- Cable glands are tight and in good condition.
- Gasket is in good condition.
- Equipment marking in order
- Equipment earthing / bonding in order
- Cables in good condition

20.4.4 Specific for protection type:
- Ex-d: The flame path is in satisfactory condition.
- Ex-p: The protective gas pressure and flow are adequate.
- Ex-m: The resin in the enclosure is not damaged.

20.4.5 Areas protected by overpressure:
- Test audible and visual alarm in manned station upon loss of pressure.
- Check automatic or manual disconnection.

20.4.6 **Annual Surveys**

20.4.6.1 Visual inspection of installations and spot-checking of equipment is to be carried out. In case of any findings, the surveyor may extend the survey as deemed necessary, requiring the examination of covering connections, conditions and functions including opening enclosures by appropriate tools.

20.4.7 **Special Surveys**

20.4.7.1 The following items are to be checked for satisfactory condition during special surveys in addition to 20.4.6:
- Scope is as for Annual Survey. Surveyor may ask for function testing if defects are found or suspected.
- Insulation monitoring with alarm to be tested.
- Megger testing of power circuits.

Note that Megger testing in gas dangerous spaces may involve risk of explosion due to sparks.
- In spaces protected by overpressure: audible and visual alarm upon loss of pressure to be tested and automatic or manual disconnection of power supply to be checked.

Actions		**Every year**	**Every Five years**
1	Electrical switchboards and section boards are to be visually examined to assess the good operation and maintenance.	x	x
2	Electric equipment is to be examined for cleanliness. Where deemed necessary, cleaning of electrical equipment (dust suction, wiping up oil water deposits).	x	x
3	It is to be checked that:		
3.1	Cables or other electric equipment are still in the original position. Any modification should be to the satisfaction of the Society.	x	x
3.2	Cable penetration devices are still in good condition (e.g. with appropriate compound).	x	x
3.3	No evidence of overheating, burning or tracking.	x	x
3.4	Measuring equipment is in order.	x	x
3.5	Mechanical ventilation, if fitted, operates as required.	x	x
3.6	Where a protection device has been replaced, its rating and, where applicable, settings are to be verified.	x	x
4	Contacts and arc screens, if any, of all concerned devices are to be checked and reconditioned or replaced if necessary in accordance with manufacturer's recommendation. Movable parts of the said devices are to be tested.		x
5	Tightening of connections and assemblies which may slacken is to be checked and tightened, if required, according to the manufacturer's recommendations. Thermograph aids may be considered to detect hot spots.		x
6	Where accumulator batteries may be stored, the condition of connections (salt deposits ...), the fastenings, the ventilation and the tray tightness are to be checked.	x	x
7	Where fitted, computer based systems (including hardware) are to be examined and tested to confirm their satisfactory condition and operation. Their original functions are to be unchanged.		x
8	An insulation measurement of any circuit in doubt is to be carried out. Any large decrease in values is to be investigated and corrected.	x	
9	All circuits are to be subject to insulation measurements for comparison with the insulation recordings previously established. Corrective actions are to be carried out if the values obtained are under 1kΩ per volt.		x
10	Circuit interlocks, if any, are to be tested		x
11	Protective devices are to be tested. The electronic protective devices for generators and large consumers are to be tested.		x
12	The operation of all emergency sources of power is to be tested, including their automatic devices if any.	x	x

Actions		**Every year**	**Every Five years**
13	All automatic sequences, e.g. for synchronization, connection, load shedding if any are to be tested as far as practicable.	x	x
14	Fastening, securing and tightness of the switchboard's cooling system, if fitted, is to be checked.	x	x

Table 1 - Maintenance and inspection actions

Section 21 – Survey requirements for DPS notations

21.1 Annual surveys

21.1.1 The vessel is to be operated for duration of at least two hours to demonstrate that the dynamic positioning system has been maintained properly and is in good working order. The operational testing is to be carried out to the Surveyor's satisfaction. Special consideration may be given, subject to the discretion of the Surveyor, when sufficient test reports are in place demonstrating that the vessel has been engaged in a DP testing program. In addition, the following items are to be generally examined so far as can be seen and placed in satisfactory condition:

21.1.1.1 Controls and Alarms: Control system, including independent emergency shut-down facility for each thruster at the main dynamic positioning control station, position keeping redundancy, and alarms and instrumentation are to be generally examined and confirmed to be functioning satisfactorily.

21.1.1.2 Environment Sensors: Windsensors(s) and gyro-compass(s) are to be generally examined and confirmed to be functioning satisfactorily.

21.1.1.3 For DP-1 Notation: The operation of the automatic control system and a manual position control system including manual transfer of control between the two systems is to be confirmed to be functioning satisfactorily.

21.1.1.4 For DPS-2 Notation: The operation of two automatic control systems and a manual position control system including automatic transfer of one automatic control system to another upon failure is to be confirmed to be functioning satisfactorily. Upon failure of the two automatic control systems, it is to be verified that the manual position control is possible. [See 21.1.6].

21.1.1.5 For DP-3 Notation: The operation of three automatic control systems and a manual position control system including automatic transfer of one automatic control system to another upon failure is to be confirmed to be functioning satisfactorily. Manual transfer of control is to be verified possible at the third automatic control system located in the emergency back-up control station. Upon failure of the automatic control systems, it is to be verified that the manual position control is possible. [See 21.1.6].

21.1.1.6 Manual Position Control System for DP-1, DP-2, and DP-3 Notations: The operation of the manual position control system using one joystick on the Navigation Bridge or DP control station in accordance with Part 6 and supplemented by an automatic heading control is to be confirmed to be functioning satisfactorily.

21.1.1.7 Manual Thruster Control System: In addition to 21.1.3 through 21.1.6, the operation of the manual thruster control system using individual levers on the Navigation Bridge or DP control station in accordance with Part 7 is to be confirmed to be functioning satisfactorily.

21.1.1.8 Alarms and Instrumentation: The following audible and visual alarms including indicators at each control station are to be examined, verified operational and confirmed to be functioning satisfactorily, as applicable:

Thruster Power System

- Engine lubricating oil pressure – low*
- Engine coolant temperature – high*
- CPP hydraulic oil pressure – low and high*
- CPP hydraulic oil temperature – high*
- CPP pitch**
- Thruster RPM**
- Thruster direction**
- Thruster motor/semiconductor converter coolant leakage*
- Thruster motor/semiconductor converter temperature**
- Thrust motor short circuit**
- Thruster motor exciter power available**
- Thruster motor supply power available**
- Thruster motor overload*
- Thruster motor high temperature*

Power Distribution System

- Status of automatically controlled circuit breakers**
- Bus bar current and power levels**
- High power consumers – current levels**

System Performance

- Excursion outside operating envelope*
- Control system fault*
- Position sensor fault*
- Vessel target and present position and heading**
- Wind speed and direction**
- Selected reference system**

21.1.1.9 *In addition, for **DP-2** and **DP-3** notations*

- Thruster location (pictorial)**
- Percentage thrust**
- Available thrusters on stand-by**
- DP alert through consequence analyzer*
- Position information of individual position reference systems connected**

* Alarm ** Display

21.1.2 Uninterruptible Power Systems (UPS). The uninterruptible power systems (UPS) are to be operated and confirmed to be functioning satisfactorily. The uninterruptible power systems (UPS) are to be operated without the normal main power input for 15 minutes to confirm that the batteries are capable of supplying the output power and are in satisfactory condition. The schedule of batteries is to be examined to verify that the batteries have been maintained.

21.1.3 Communication

21.1.3.1 A means of voice communication between the DP control position (navigation bridge), and the thruster room(s) is to be tested and confirmed to be functioning satisfactorily.

21.1.3.2 A means of voice communication between the DP control position (Navigation Bridge), the engine control position and any operational control centers associated with DP is to be tested and confirmed to be functioning satisfactorily.
Note: No back up required.

21.1.4 Dynamic Positioning System. Confirmation of dynamic positioning system operations manual onboard. Verification that the manual is up to date with any modifications performed on the installation.

21.2 First Drydocking Survey after Delivery

21.2.1 At the first drydocking survey after delivery, thruster units are to be examined and confirmed in satisfactory condition including the following.

21.2.1.1 External examination including propeller, gear housing, bolting and their securing arrangements and for seal leakage.

21.2.1.2 Internal gear train examination through inspection opening. Where inspection opening is not provided, at least one unit is to be opened for examination.

21.2.1.3 Lubrication oil sample analysis.

21.2.1.4 In addition, for controllable pitch propellers, blade seal leak check and functional test. Where deemed necessary by the Surveyor, non destructive testing may be required. In case the first drydocking survey after delivery is the first Special Periodical Survey after delivery, [20.3] will apply and in addition, [20.2 ii)] is to be carried out.

21.3 Special Periodical Surveys

In addition to the requirements of the Annual Survey, complete performance tests are to be carried out to the Surveyor's satisfaction. The schedule of these tests is to be designed to demonstrate the level of redundancy established in the FMEA (Failure Modes and Effects Analysis,) for **DP-2** and **DP-3**. In addition, thrusters are to be surveyed as part of the Special Periodical Survey in accordance [with 21.3].

Section 22 – Survey requirements for OPS (Onshore Power Supply) notations

22.1 General

22.1.1 The OPS (Onshore Power Supply) notation is assigned when technical arrangements of high voltage shore connection (HVSC) systems installed onboard to allow the supply of the ship with electrical power for service purposes from shore with a shore-to-ship connection.

22.1.2 The rules and regulations referred to HVSC systems in the herein section have practicable applications for ships requiring 1 MW or more or ships with HV main supply.

22.1.3 The Low-voltage shore connection systems and related equipment are not covered by the rules and regulations of the current Section.

22.1.4 Different arrangements from those described in this Guide which can provide an equivalent level of safety may be taken into account based on their technical merits.

22.1.5 The OPS installations referred in the herein Section are in accordance with the IEC/ISO/IEEE 80005-1:2012.

22.2 Definitions

Cable management system	refers to the equipment designed to control, monitor and handle the HV-flexible and control cables and their connection devices
High Voltage Shore Connection (HVSC) System	Those onboard systems that are designed to accept high voltage shore power, typically involving incoming power receptacles, shore connection switchgear, step-down transformer or isolation transformer, fixed power cables, incoming switchgear at the main switchboard and associated instrumentation. HVSC is often referred to as Cold Ironing or Alternative Marine Power.
Low Voltage (LV)	For the purpose of these rules, the nominal voltage of the system is taken into a range between 1 kV AC to 15 kV AC
High Voltage (HV)	For the purpose of these rules, the nominal voltage of the system is taken up to and including 1 kV AC.
Electrical Grounding System	It refers to the way the electrical system is grounded (e.g., ungrounded system, solid neutral grounding system, low impedance neutral grounding system, or high impedance neutral grounding system). It also includes the ground potential transformer method. Circuit protection prevention is developed around the selected method of system grounding regarding overvoltage prevention, over current prevention or continued operability under single phase grounded condition.
Cable Management System	The cable management system is the ship's interface point with the shore power system. The cable management system is typically composed of flexible HV cables with the plug that extends to the shore power receptacle, cable reel, automatic tension control system with associated control gears, and instrumentation. Shore power is fed to the shore connection switchboard via the cable management system.
Shore Connection Switchboard	Where no cable management system is provided onboard, the shore connection switchboard is normally the ship's interface point with the shore power system. HV shore power is connected to this shore connection switchboard using an HV plug and socket arrangement. The shore connection switchboard is provided with a shore power connecting circuit breaker with circuit protection devices.
Onboard Receiving Switchboard	The receiving switchboard is normally a part of the ship's main switchboard to which the shore power is fed from the shore connection switchboard.

Receiving point	Connection point of the high voltage (HV) flexible cable on the ship.
Safe	Condition in which safety risks are minimized to an acceptable level.
Supply point	It refers to the connection point of the flexible cable on shore.

22.3 System description and requirements

22.3.1 A typical HVSC system described in this standard consists of hardware components as shown in Figure 1.

22.3.2 The Shore HV supply line provides high voltage power supply from 6.6kV to 27 kV from the local power distribution network. A transformer converts the power to a voltage of 6.6kV or 11kV, to deliver power onboard. The HV shore supply system consists of a protection relaying circuit that prevents the system from overloading. The electrical power is transmitted to the HV onboard receiving system using an HV flexible power cable which is generally, but not necessarily is included to ship's equipment. On the ship's side, there is also a protection relay circuit that prevents the system from overload. A switchboard for shore connection is installed onboard to receive power from shore supply system. The onboard system may also have a transformer, and finally, there is the main onboard receiving switchboard, which is used to supply the main distribution network with the supplied power.

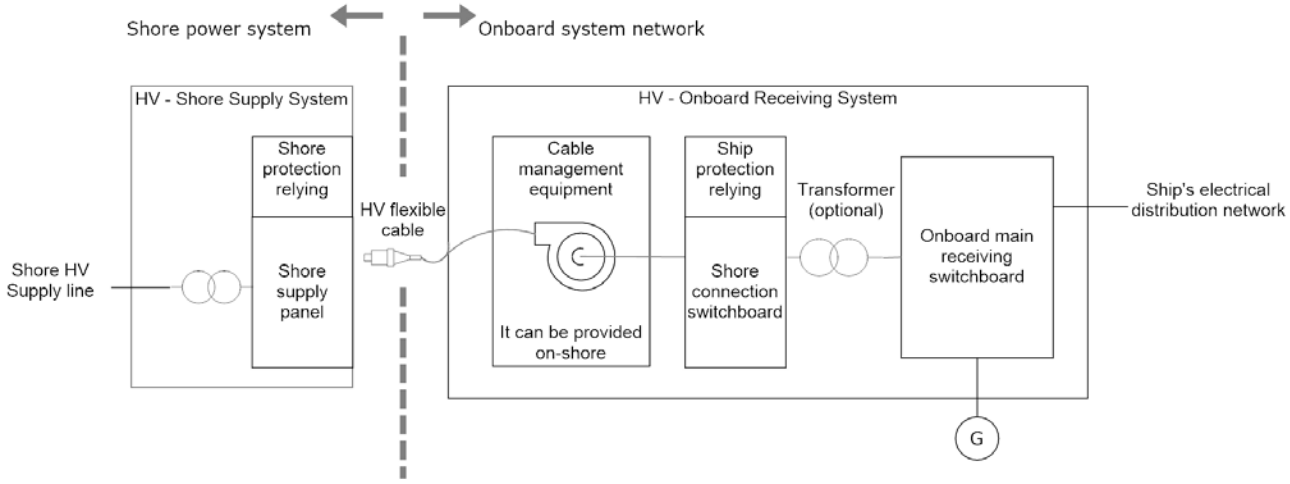


Figure 1: Typical HVSC system description

22.3.3 The Ship to shore connection and interface equipment refers to the standardized HVSC systems, cables, earthing and communications between ship and shore. The ship to shore connection cable installation shall be arranged to provide adequate movement compensation, cable guidance and anchoring/positioning of the cable during normally planned ship to shore connection and operating conditions. The cable is fitted on the shore end with a plug and the ship's end with a connector. Ship to shore connection cable extensions shall not be permitted.

22.3.4 A cable management system shall be installed able to:

- Allow the ship to shore connection cable to move freely, enabling the cable to reach between the socket-outlet and the inlet;
- Allow the cable to maintain an optimum length minimizing slack cable, and preventing tension limits from being exceeded;
- monitor maximum cable tension and maximum cable pay-out by using special devices such as limit switches,
- prevent the cable from submersion during service time;
- prevent interference with ship berthing and mooring systems, including the systems of ships that do not connect to shore power while berthed at the facility;
- maintain the bending radius of cables above the minimum bending radius recommended by the manufacturer during service;
- supporting the cables over different ship draughts and tidal ranges;
- restoring the cables when the operation completes.

22.3.5 The Plugs and socket-outlets shall be in accordance to IEC 62613-1 and IEC 62613-2, and additionally, shall satisfy the following:

- The plug and socket-outlet arrangement shall be fitted with a mechanical securing device that locks the connection in the engaged position.
- The design should prevent incorrect connection to be made.
- The Socket-outlets and inlets shall be interlocked with the earth switch so that plugs or connectors cannot be inserted or withdrawn without the earthing switch in the closed position.
- Handling of plug and socket outlets shall be possible only when the associated earthing switch is closed.
- Each plug shall be fitted with pilot contacts for continuity verification of the safety circuit.
- An optical fibre connection shall be integrated on the ship plug. A fibre optical receptacle shall be mounted at the plug and at adjacent to the socket-outlet as well. The connection between these two parts shall be made with a separate cable with two plugs.

22.3.6 The Ship to shore connection cable shall be at least of a flame-retardant type by the requirements given in IEC 60332-1-2. The outer sheath shall be oil-resistant and resistant to sea air, seawater, solar radiation (UV) and shall be non-hygroscopic. The temperature class shall be at least 90 °C, insulation. The correction factor for ambient air temperatures above 45 °C shall be taken into account. The maximum operating temperature shall not exceed 95 °C, taking into account any heating effects.

22.3.7 Control and monitoring cables shall be at least of a flame retardant type by the requirements of IEC 60332-1-2.

22.3.8 Arrangements shall be provided for stowage when not in use, such that:
- ship board equipment is stored in dry spaces;
- shore based equipment shall comply with national standards;
- removable equipment shall be stowed, stored and removed without damage;
- equipment does not present a hazard during normal ship operation; and
- during storage, the plugs, socket-outlets, inlets and connectors shall maintain their IP ratings.

22.3.9 The following systems shall provide the ship electrical distribution system protection:
- A Short-circuit protection which prevents the system from exceeding the maximum prospective short-circuits current for which HV-shore supply or ship-electrical- system / equipment is rated and earth fault protection, monitoring and alarm devices which shall be of a type designed to operate effectively when connected to an HVSC supply with distribution system earthing
- A shore connection switchboard installed at a suitable location nearby to the receiving point including a circuit breaker to protect the ship electrical equipment downstream. The switchboard should contain at least a Circuit-breaker, disconnector and earthing switch, as well as, adequate instrumentation and protection devices such as three phases voltmeter, short-circuit and overcurrent devices: tripping and alarm, the alarm of earth-fault indicator, and unbalanced protection for systems with more than one inlet.

22.3.10 On-board transformer, if applicable, shall be of the separate winding type for the primary and secondary side. The secondary side shall be star configuration. If the transformer supplies LV-systems, a shield winding shall be provided between HV and LV winding. The neutral point of the transformer shall be connected to the main switchboard according to the earthing method used for the main distribution system. Galvanic separation between the shore and on board systems shall be provided.

22.3.11 The on board receiving switchboard connection point shall be a panel including the following:
- A Circuit-breaker and earthing switch
- Adequate instrumentation such as voltmeters, frequency meters, ammeter with an ammeter switch to enable the current in each phase to be read, or an ammeter in each phase, phase sequence indicator, and synchronizing device.
- Effective tripping and alarm criteria for the circuit-breaker,
- Suitable arrangements so that the circuit-breakers cannot be closed in case that one of the earthing switches is closed, or emergency-stop facilities are activated, or the HV supply is not present, or even earth fault on ship distribution system is detected, or equipotential bonding is not established or finally the data communication link between shore and ship is not operational.

22.3.12 When the ship main source of electrical power is shut down and failure of the connected HVSC supply occurs, shore connection circuit-breakers shall automatically open followed by:
- Starting with the emergency source of electrical power to supply emergency services
- automatic connection of the transitional source of electrical power to emergency services,
- starting and connecting to the main switchboard of the main source of electrical power and sequential restarting of essential services, in the shortest time practical. This shall be automatic in the event of emergency shut-down activation.

22.3.13 Regarding the HVSC system control and monitoring the Ship equipment shall be protected and controlled by the ship's protection and control systems.

22.3.14 If the shore supply fails for any reason, supply by the ship's generators is permitted, after disconnecting shore supply. Load transfer shall be provided via blackout or automatic synchronization.

22.4 Surveys

22.4.1 All HV systems components shall have passed type tests and routine tests according to relevant standards.

22.4.2 The HV system, including control equipment, shall be tested according to a prescriptive test program. Tests shall be performed to demonstrate that the electrical system, control, monitoring and alarm systems have been correctly installed and are in good working order before being put into service. Tests shall be realistic and simulations avoided as far as is practicable.

22.4.3 If the equipment has not been used for a period of 30 months, the initial tests shall be repeated.

22.4.4 These tests shall verify that the ship side installation complies with this standard. The target is to achieve a test certificate. Tests shall be performed after completion of the installation. These tests shall be conducted as witness tests together with the appropriate authorities.

22.4.5 The following tests shall be performed after the Initial of ship side installation:
- visual inspection;
- power frequency test for HV switchgear assemblies and voltage test for cables (see IEC 62271-200 and IEC 60502-2);
- insulation resistance measurement;
- measurement of the earthing resistance;
- function test including correct settings of the protection devices;
- function test of the interlocking system;
- function test of the control equipment;
- phase-sequence test;
- function test of the cable management system, where applicable; and
- integration tests to demonstrate that the shipside installations like power management system, integrated alarm, monitoring and control system work properly together with the new installation.

22.4.6 A record of annual maintenance, repair, equipment modifications and the test results shall be available for the shore and ship side HVSC system.

22.4.7 Regarding the documentation for the HVSC system and each control apparatus, the manufacturer shall deliver documentation concerning principles of operation, technical specifications, mounting instructions, required start up or commissioning procedures, fault-finding procedures, maintenance and repair, as well as lists of necessary test facilities and replaceable parts.

22.4.8 A complete system description, including circuit diagrams, specifying set points and operation instructions, shall be prepared by parties responsible for shore and ship HVSC systems.

22.4.9 The parties responsible for shore and ship HVSC systems, shall provide a testing and verification program for the whole installation that will demonstrate compliance with the specification.

22.4.10 The following shall be performed or provided:
- visual inspection;
- confirmation that no earth fault is present;
- statement of voltage and frequency; and
- an authorized switching and connection procedure or equivalent.

Procedures should include an approved “Lock-out, Tag-out” system that is jointly controlled by the ship and shore PIC.

22.4.11 Where the ship has been assigned an **OPS** notation, the on-shore power supply arrangements are to be examine annually as per Part 8 of DBS rules. In addition, a Special Survey is to be done at intervals not exceeding five years.

22.4.12 For ships having an **OPS** notation assigned, the on-shore power supply arrangements are to be examined and functionally tested while connected to an external electrical power supply in accordance with approved test schedules [see Part 7 of DBS Rules] during the Complete Surveys of machinery or, where it is not practical to provide the facilities and operations for testing during the required Surveys of other machinery items, within 12 months of the due date of the Complete Surveys of machinery.

Section 23 – Surveys for Ballast Water Management Systems (BWMS)

23.1 General

23.1.1 The herein Section refers to the requirements are applied to the installation and survey of Ballast Water Management Systems according to BWM Convention (2004).

23.2 Definitions

23.2.1 Ballast Water Management System (hereinafter referred to as 'BWMS') means any system which processes ballast water such that it meets or exceeds the Ballast Water Performance Standard in Regulation D-2 of the BWM Convention. The BWMS includes ballast water management equipment, all associated control equipment, monitoring equipment and sampling facilities.

23.2.2 Dangerous gas means any gas which may develop an explosive and/or toxic atmosphere being hazardous to the crew and/or the ship, e.g. hydrogen (H2), hydrocarbon gas, ozone (O3), chlorine (Cl2) and chlorine dioxide (ClO2), etc.

23.2.3 Hazardous area means an area in which an explosive gas atmosphere is or may be expected to be present, in quantities such as to require special precautions for the construction, installation and use of equipment. When a gas atmosphere is present, the following hazards may also be present: toxicity, asphyxiation, corrosivity and reactivity.

23.2.4 Dangerous liquid means any liquid that is identified as hazardous in the Material Safety Data Sheet or other documentation relating to this liquid. External surveys.

23.3 Installations requirements

23.3.1 All valves, piping fittings and flanges are to comply with the relevant requirements of Part 6/Chapter 8. In addition, special consideration can be given to the material used for this service with the agreement of DBS.

23.3.2 The BWMS is to be provided with by-pass or override arrangement to effectively isolate it from any essential ship system to which it is connected.

23.3.3 The BWMS is to be operated at a flow rate within the Treatment Rated Capacity (TRC) range specified in the Type Approval Certificate (TAC) issued by the Flag Administration.

23.3.4 Where a vacuum may occur in the ballast line due to the height difference, a suitable protection means is to be provided, e.g. P/V valves or breather valves, and their outlets are to be led to safe area on open deck.

23.3.5 Electric and electronic components are not to be installed in a hazardous area unless they are of certified safe type for use in the area. Cable penetrations of decks and bulkheads are to be sealed when a pressure difference between the areas is to be maintained.

23.3.6 Where the operating principle of the BWMS involves the generation of a dangerous gas, the following requirements are to be satisfied:

23.3.6.1 Gas detection equipment is to be fitted in the spaces where dangerous gas could be present, and an audible and visual alarm is to be activated both locally and at the BWMS control station in the event of leakage. The gas detection device is to be designed and tested in accordance with IEC 60079-29-1 or recognized standards acceptable to the Society.

23.3.6.2 The ventilation line of a space where dangerous gas could be present is to be led to a safe area on open deck.

23.3.6.3 The arrangements used for gas relieving, i.e. degas equipment or equivalent, are to be provided with monitoring measures with independent shutdown. The open end of the gas relieving device is to be led to a safe area on open deck.

23.3.7 Ballast piping, including sampling lines from ballast tanks considered as hazardous areas, is not to be led to an enclosed space regarded as a safe area, without any appropriate measures, except ships carrying liquefied gases in bulk. However, a sampling point for checking the performance of BWMS, for ballast water containing dangerous gas, may be located in a safe area provided the following requirements are fulfilled:

23.3.7.1 The sampling facility (for BWMS monitoring/control) is to be located within a gas tight enclosure (hereinafter, referred to as a 'cabinet'), and the following items are to be complied.

- In the cabinet, a stop valve is to be installed in each sample pipe.
- Gas detection equipment is to be installed in the cabinet and the valves specified in the above cabinet are to be automatically closed upon activation of the gas detection equipment.
- Audible and visual alarm signals are to be activated both locally and at the BWMS control station when the concentration of explosive gases reaches a pre-set value, which should not be higher than 30% of the lower flammable limit (LFL) of the concerned product.

23.3.7.2 The standard internal diameter of sampling pipes is to be the minimum necessary in order to achieve the functional requirements of the sampling system.

23.3.7.3 The measuring system is to be installed as close to the bulkhead as possible, and the length of measuring pipe in any safe area is to be as short as possible.

23.3.7.4 Stop valves are to be located in the safe area, in both the suction and return pipes close to the bulkhead penetrations. A warning plate stating "Keep valve closed when not performing measurements" is to be posted near the valves. Furthermore, in order to prevent backflow, a water seal or equivalent arrangement is to be installed on the hazardous area side of the return pipe.

23.3.7.5 A safety valve is to be installed on the hazardous area side of each sampling pipe.

23.3.8 For the spaces, including hazardous areas, where toxicity, asphyxiation, corrosivity or reactivity is present, these hazards are to be taken into account and additional precautions for the ventilation of the spaces and protection of the crew are to be considered.

23.3.9 A BWMS that does not generate dangerous gas is to be located in an adequately ventilated area. A BWMS that generates dangerous gas is to be located in a space fitted with a mechanical ventilation system providing at least 6 air changes per hour or as specified by the BWMS manufacturer, whichever is greater.

23.3.10 A BWMS, regardless of whether or not it generates dangerous gas, is to be located in a space fitted with mechanical ventilation complying with relevant requirements, e.g. IEC60092-502, IBC Code, IGC Code, etc.

23.3.11 The length of pipe and the number of connections are to be minimised in piping systems containing dangerous gases/liquids in high concentration. The following requirements are also to be satisfied:

23.3.12 Pipe joints are to be of welded type except for connections to shut off valves, double walled pipes or pipes in ducts equipped with mechanical exhaust ventilation. Alternatively it is to be demonstrated that risk of leakage is minimized and the formation of toxic or flammable atmosphere is prevented.

23.3.13 Location of the piping system is to be away from heat sources and protected from mechanical damage.

23.3.14 For BWMS using chemical substances, handling procedures are to be in accordance with the Material Safety Data Sheet and BWM.2/Circ.20, and the following measures are to be taken as appropriate:

23.3.14.1 The materials used for the chemical storage tanks, piping and fittings are to be resistant to such chemicals.

23.3.14.2 Chemical storage tanks are to have sufficient strength and be constructed such that maintenance and inspection can be easily performed.

23.3.14.3 Chemical storage tank air pipes are to be led to a safe area on open deck.

23.3.14.4 An operation manual containing chemical injection procedures, alarm systems, measures in case of emergency, etc, is to be kept onboard.

23.3.15 Where the BWMS is installed in an independent compartment, the compartment is to be:

23.3.15.1 Provided with fire integrity equivalent to other machinery spaces.

23.3.15.2 Positioned outside of any combustible, corrosive, toxic, or hazardous areas unless otherwise specifically approved.

23.3.16 A risk assessment may be conducted to ensure that risks, including but not limited to those arising from the use of dangerous gas affecting persons on board, the environment, the structural strength or the integrity of the ship are addressed.

23.3.17 In case of any by-pass or override operation of BWMS, an audible and visual alarm is to be given and these events are to be automatically recorded in control equipment. The valves in the by-pass line which trigger the by-pass operation are to be remote-controllable by control equipment or fitted with open/close indicator for automatic detection of the by-pass event.

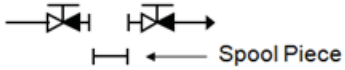
23.4 Additional requirements for tankers

23.4.1 Hazardous area classification is to be in accordance with IEC 60092-502.

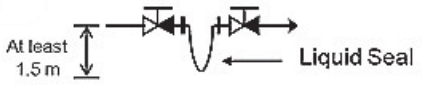
23.4.2 For tankers carrying flammable liquids having a flashpoint not exceeding 60 ^{o}C or products listed in the IBC Code having a flashpoint not exceeding 60 ^{o}C or cargoes heated to temperature above their flashpoint and cargoes heated to temperature within 15 ^{o}C of their flashpoint. In general, two independent BWMS may be required – i.e. one for ballast tanks in hazardous areas and the other for ballast tanks in non-hazardous areas.

23.4.3 The interconnection of ballast piping between hazardous areas and in nonhazardous areas may be accepted if an appropriate isolation arrangement is applied. Means of appropriate isolation are as follows:

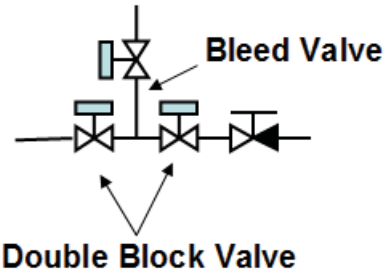
23.4.3.1 Two screw down check valves in series with a spool piece, or.



23.4.3.2 Two screw down check valves in series with a liquid seal at least 1.5 m in depth, or

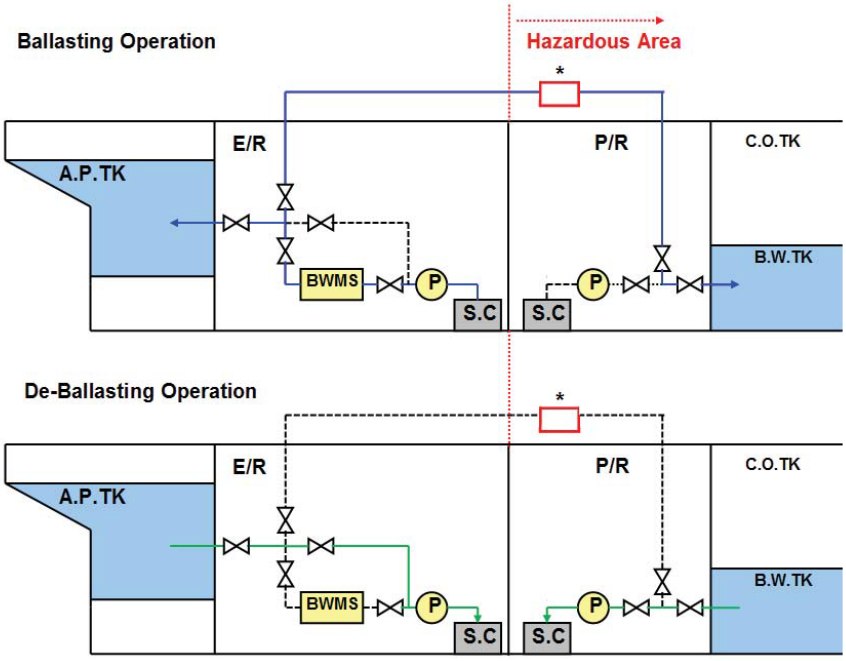


23.4.3.3 Automatic double block and bleed valves and a non-return valve

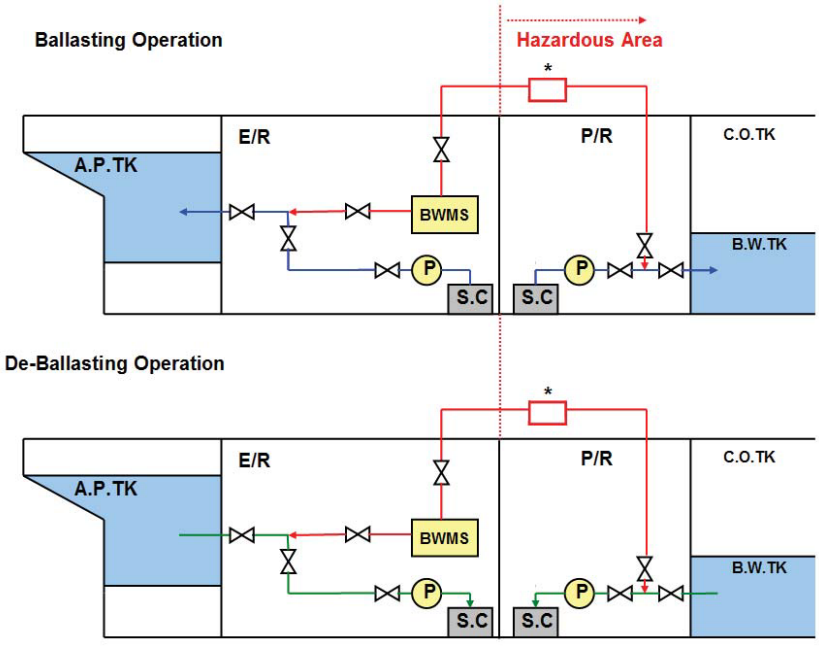


Examples of appropriate isolation arrangements are shown in 23.4.4. Isolation arrangements are to be fitted on the exposed deck in the hazardous area. Also, ballast water originating from a hazardous area is not to discharge into a non-hazardous area, except as given by 23.3.

23.4.4 Surveys for BWMS

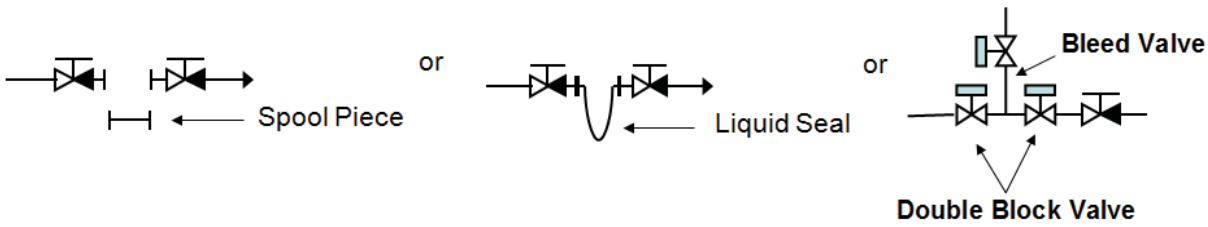


BWMS which does not require after-treatment



BWMS which requires after-treatment (Injection type)

* : Appropriate Isolation Means: Two (2) screw down check valves in series with a spool piece or a liquid seal, or automatic double block and bleed valves


or
Spool Piece
or
Liquid Seal
Bleed Valve
Double Block Valve

Section 24 – Hull Survey for New Construction

24.1 General requirements

24.1.1 The scope of this Section is to provide the guidelines for the examination of the parts of the ship covered by the DBS rules and by the applicable statutory regulations for hull construction, to obtain appropriate evidence that they have been built in compliance with the rules and regulations, taking account of the relevant approved drawings.

24.1.2 This section also applies to the appraisal of the manufacturing, construction, control and qualification procedures, including welding consumables, weld procedures, weld connections and assemblies, with indication of relevant approval tests. In addition, the items for inspection and testing as required by the DBS rules for ship construction including materials, welding and assembling are properly specified.

24.1.3 Examination of material and equipment used for ship construction and their inspection at works is not covered into this section. Details of requirements for hull and machinery steel forgings and castings and for normal and higher strength hull structural steel are given in Chapter 2 of current Part 1. Acceptance of these items is verified through the survey process carried out at the manufacturer's works and the issuing of the appropriate certificates.

24.1.4 In addition to above, for Tankers and Bulk Carriers subject to SOLAS Chapter II-1 Part A-1 Regulation 3-10 (Goal-based ship construction standards for bulk carriers and oil tankers), see also paragraph 24.12 of this Section.

24.2 Definitions

24.2.1 The hull structure is defined as follows:
- hull envelope including all internal and external structures;
- superstructures, deckhouses and casings;
- welded foundations, e.g. main engine seatings;
- hatch coamings, bulwarks;
- all penetrations fitted and welded into bulkheads, decks and shell;
- the fittings of all connections to decks, bulkheads and shell, such as air pipes and ship side valves – all ILLC 1966, as amended, items;
- welded attachments to shell, decks and primary members, e.g. crane pedestals, bitts and bollards, but only as regards their interaction on the hull structure.

24.2.2 Reference to documents also includes electronic transmission or storage.

24.2.3 Definition of survey methods which the surveyor is directly involved in: Patrol, Review, Witness.

24.2.3.1 Patrol, the act of checking on an independent and unscheduled basis that the applicable processes, activities and associated documentation of the shipbuilding functions identified in Table 1 continue to conform to classification and statutory requirements.

24.2.3.2 Review, the act of examining documents in order to determine traceability, identification and to confirm that processes continue to conform to classification and statutory requirements.

24.2.3.3 Witness is the attendance at scheduled inspections in accordance with the agreed Inspection and Test Plans to the extent necessary to check compliance with the survey requirements.

24.3 Applicability of the survey

24.3.1 This Section covers the survey of all new construction of steel ships intended for classification and for international voyages except for:
- those defined in SOLAS I/3;
- high speed craft as defined in I/1.3.1 of the 2000 High Speed Craft Code;
- Mobile Offshore Drilling Units as defined in I/1.2.1 of the MODU Code.

24.3.2 This Section covers all statutory items, relevant to the hull structure and coating, i.e. Load Line and SOLAS Safety Construction.

24.3.3 This Section does not cover the manufacture of equipment, fittings and appendages regardless whether they are made inside or outside of the shipyard, examples being as follows.

24.3.4 This Section applies to the installation into the ship, welding and testing of:
- hatch covers;
- doors and ramps integral with the shell and bulkheads;
- rudders and rudder stock;
- all forgings and castings integral to the hull.
- Equipment forming part of the watertight and weather tight integrity of the ship.

24.3.5 This Section applies to the hull structures and coating constructed at any of the following:
- shipbuilder's facilities;
- sub-contractors at the shipbuilder's facilities;
- sub-contractors at their own facilities or at other remote locations.

24.4 Qualification and monitoring of personnel

24.4.1 Exclusive surveyors of the DBS society, are to confirm through patrol, review and witness as defined in para. 26.2.3, that the ships are built using approved plans in accordance with the relevant rules and statutory requirements. The DBS surveyors are to be qualified to be able to carry out the tasks and procedures are to be in place to ensure that their activities are monitored.

24.5 Survey of the hull structure

24.5.1 Table 1 provides a list of surveyable items for the hull structure and coating covered by this Section, including:
- description of the shipbuilding functions;
- classification and statutory survey requirements;
- survey method required for classification;
- relevant IACS and statutory requirement references;
- documentation to be available for the classification surveyor during construction.

24.5.2 The shipbuilder is to provide the DBS surveyors access to documentation required by classification, this includes documentation retained by the shipbuilder or other third parties.

24.5.3 The list of documents approved or reviewed by the DBS society for the specific new construction are as follows:
- plans and supporting documents
- examination and testing plans
- NDE plans
- welding consumable details
- welding procedure specifications
- welding plan or details
- welder's qualification records
- NDE operator's qualification records

24.5.4 For the documents to be inserted into the ship construction file, refer to paragraph 24.10 for details.

24.5.5 An indicate list of specific activities which are relevant to the shipbuilding functions is shown in Table 1.

24.5.6 Evidence is also to be made available, as required, by the shipbuilder, to the DBS surveyor whilst the construction process proceeds to prove that the material and equipment supplied to the ship has been built or manufactured under survey relevant to the classification rules and statutory requirements.

24.6 Review of the construction facility

24.6.1 DBS is to familiarize themselves with the yard's production facilities, management processes, and Safety for consideration in complying with the requirements of Table 1 prior to any steelwork or construction taking place in the following circumstances:

24.6.1.2 where the society has none or no recent experience of the construction facilities- typically after a one-year lapse - or when significant new infrastructure has been added;

24.6.1.3 where there has been a significant management or personnel re-structuring having an impact on the ship construction process;

24.6.1.4 or where the shipbuilder contracts to construct a vessel of a different type or substantially different in design.

24.7 Newbuilding survey planning

24.7.1 Prior to commencement of surveys for any newbuilding project, the society is to discuss with the shipbuilder at a kick off meeting the items listed in Table 1. The purpose of the meeting is to review and agree how the list of specific activities shown in Table 1 is to be addressed. The meeting is to take into account the shipbuilder's construction facilities and ship type including the list of proposed subcontractors. A record of the meeting is to be made, based upon the contents of the Table 1 – the Table can be used as the record with comments made into the appropriate column. If the society has nominated a surveyor for a specific newbuilding project, then the surveyor is to attend the kick off meeting.

24.7.2 The builder should agree to undertake ad hoc investigations during construction as may be requested by DBS Class where areas of concern arise and the builder to agree to keep the DBS society advised of the progress of any investigation. Whenever an investigation is undertaken, the builder is to be requested, in principle, to agree to suspend relevant construction activities if warranted by the severity of the problem.

24.7.3 The records are to take note of specific published Administration requirements and interpretations of statutory requirements.

24.7.4 The shipyard shall be requested to advise of any changes to the activities agreed at the kick off meeting and these are to be documented in the survey plan. e.g. if the shipbuilder chooses to use or change sub-contractors, or to incorporate any modifications necessitated by changes in production or inspection methods, rules and regulations, structural modifications, or in the event where increased inspection requirements are deemed necessary as a result of a substantial non-conformance or otherwise.

24.7.5 Shipbuilding quality standards for the hull structure during new construction are to be reviewed and agreed during the kick-off meeting. Structural fabrication is to be carried out in accordance with recognized fabrication standard which has been accepted by the DBS prior to the commencement of fabrication/construction. The work is to be carried out in accordance with the Rules and under survey of the DBS.

24.7.6 The kick-off meeting may be attended by other parties (owner, administrations, etc.) subject to agreement by the shipbuilder.

24.7.7 In the event of series ship production (vessels in the series subsequent to a prototype, i.e. sister ships built in the same shipyard), the requirement for a kick off meeting may be waived for the second and subsequent ships provided that no changes to the specific activities agreed in the kick off meeting for the first ship are introduced. If any changes are introduced, these are to be agreed in a new dedicated meeting and documented in a record of such meeting.

24.8 Examination and test plan for newbuilding activities

24.8.1 The shipbuilder is to provide plans of the items which are intended to be examined and tested. These plans need not be submitted for approval and examination at the time of the kick off meeting. They are to include:

- proposals for the examination of completed steelwork - generally referred to as the block plan and are to include details of joining blocks together at the pre-erection and erection stages or at other relevant stages;
- proposals for fit up examinations where necessary;
- proposals for testing of the structure (leak and hydrostatic) as well as for all watertight and weathertight closing appliances;
- proposals for non-destructive examination;
- any other proposals specific to the ship type or to the statutory requirements.

24.8.2 The plans and any modifications to them are to be submitted to the surveyors in sufficient time to allow review before the relevant survey activity commences.

24.8.3 In addition to above, for Tankers and Bulk Carriers subject to SOLAS Chapter II-1 Part A-1 Regulation 3-10 see also … to this Section.

24.9 Proof of the consistency of surveys

24.9.1 The DBS is to be able to provide evidence, e.g. through records, check lists, inspection and test records, etc. that its surveyors have complied with the requirements of the newbuilding survey planning and duly participated in the relevant activities shown in the shipbuilder's examination and test plans.

24.9.2 In addition, DBS is to maintain records of deficiencies found during the patrolling activities required in Table 1. Records shall include the date when deficiency was found, description of the deficiency and the date the deficiency was cleared.

24.10 Ship Construction File

24.10.1 The purposes of this paragraph are applicable to all ships except the Tankers and Bulk Carriers subject to SOLAS Chapter II-1 Part A-1 Regulation 3-10 for which the paragraph 24.12.3 of this Section is to be applied.

24.10.2 The shipbuilder is to deliver documents for the Ship Construction File. In the event that items have been provided by another party such as the shipowner and where separate arrangements have been made for document delivery which excludes the shipbuilder, that party has the responsibility. The Ship Construction File shall be reviewed for content in accordance with the requirements of paragraph 24.10.3 of this Section.

24.10.3 It is recognized that the purpose of documents held in the Ship Construction File on board the ship, is to facilitate inspection (survey) and repair and maintenance, and, therefore, is to include in addition to documents listed in Table 1, but not be limited to:

24.10.3.1 as-built structural drawings including scantling details, material details, and, as applicable, wastage allowances, location of butts and seams, cross section details and locations of all partial and full penetration welds, areas identified for close attention and rudders

24.10.3.2 manuals required for classification and statutory requirements, e.g. loading and stability, bow doors and inner doors and side shell doors and stern doors – operations and maintenance manuals (**Part 8, Ch. 7, Sec. 1, par 1.4** and **Part 8, Ch. 7, Sec. 1, par 1.5**);

24.10.3.3 ship structure access manual, as applicable;

24.10.3.4 copies of certificates of forgings and castings welded into the hull; (**Part 2, Ch. 1&2**)

24.10.3.5 details of equipment forming part of the watertight and weather tight integrity of the ship;

24.10.3.6 tank testing plan including details of the test requirements;

24.10.3.7 corrosion protection specifications; (**Part 4, Ch, 7, Sec. 1.2 and Part 8, Ch.2, Sec. 3, par. 3.13**);

24.10.3.8 details for the in-water survey, if applicable, information for divers, clearances measurements instructions etc., tank and compartment boundaries;

24.10.3.9 docking plan and details of all penetrations normally examined at drydocking;

24.10.3.10 Coating Technical File, for ships subject to compliance with the IMO Performance Standard for Protective Coatings (PSPC) as a class requirement under the IACS Common Structural Rules.

Table 1, Hull Surveyable Items Activities Table, Rev.5									
Reference	**Shipbuilding function**	**Survey Requirements for Classification**	**Survey Method required for Classification**	**IACS reference ***	**statutory requirements and relevant reference**	**Documentation available to classification surveyor during construction**	**Documentation for ship construction file**	**Specific activities**	**Classification society proposals for the project**
	shipbuilding quality control function								
1	**welding**								
1.1	**welding consumables**	Classification approved separately at the manufacturer	review approval status and patrol, verify storage, handling and treatment in accordance with manufacturer's requirements	UR W17		consumable specification and approval status	not required	Identify consumables against approved list	
								verify temporary and permanent storage facilities	e.g. kept dry, covered, where applicable heated
								verify traceability	e.g. random batch number checking
1.2	**welder qualification**	Qualified welders	review of welder certification and patrol	Recommendation 47		shipyards records with individual's identification	not required	verify welder qualification standard, e.g. class or recognised standard approval	
								verify welder approved for weld position	
								verify validity of qualification certificate	

Table 1, Hull Surveyable Items Activities Table, Rev.5									
Reference	**Shipbuilding function**	**Survey Requirements for Classification**	**Survey Method required for Classification**	**IACS reference ***	**statutory requirements and relevant reference**	**Documentation available to classification surveyor during construction**	**Documentation for ship construction file**	**Specific activities**	**Classification society proposals for the project**
1.3	**Welding - mechanical properties (welding procedures)**	All weld joint configurations, positions and materials to be covered by weld procedures approved by the classification society or by another IACS member available	review and patrol	UR W28		Approved weld procedure specification and welding plan relevant to the ship project or process	not required	verify procedures are available at relevant workstations	
		the classification society witnesses all new weld procedure qualification tests carried out in the shipyard whenever the classification society is surveying in the shipyard	witness					verify weld procedures records have been approved and cover all weld processes and positions in accordance with classification or recognised standards and are available for the surveyors reference	
1.3a	**welding equipment**	correctly calibrated and maintained	patrol and review			shipbuilders maintenance and calibration records	not required	verify condition of machinery and equipment.	
								verify machines are calibrated by appropriate staff	
								verify calibration carried out in accordance with manufacturer's recommendations	
								verify calibration in accordance with maintenance schedule	

Table 1, Hull Surveyable Items Activities Table, Rev.5									
Reference	**Shipbuilding function**	**Survey Requirements for Classification**	**Survey Method required for Classification**	**IACS reference ***	**statutory requirements and relevant reference**	**Documentation available to classification surveyor during construction**	**Documentation for ship construction file**	**Specific activities**	**Classification society proposals for the project**
1.3b	**welding environment**	satisfactory environment	patrol	Recommendation 47			not required	Verify welding areas clean, dry, well lit.	
								Confirm relevant measures taken for any pre or post heat treatment, drying of surfaces prior to welding	
								Confirm shielding gases, fluxes protected	
1.3c	**welding supervision**	sufficient number of skilled supervisors	Review and patrol	Recommendation 20 and 47				verify supervision is effective	
1.4	**welding- surface discontinuities**	Substantially free from significant indications, satisfactory profile and size	visual examination, surface detection techniques, review of documents and patrol of operator	Recommendation 20 and 47		Shipbuilders and recognised standards and Rules as applicable, welding and NDT plans, NDT reports, operator qualifications	not required	Identify workstations where NDT is carried out, e.g. panel line butt welds, castings into hull structure	
								Verify NDT carried out in accordance with approved plans where applicable	
								Verify suitability of NDT methods	
								Verify operators suitably qualified particularly where sub-contractors have been employed	
								Verify NDT is carried out according to the acceptable process	
								Review NDT records	

Table 1, Hull Surveyable Items Activities Table, Rev.5									
Reference	**Shipbuilding function**	**Survey Requirements for Classification**	**Survey Method required for Classification**	**IACS reference ***	**statutory requirements and relevant reference**	**Documentation available to classification surveyor during construction**	**Documentation for ship construction file**	**Specific activities**	**Classification society proposals for the project**
1.5	**Welding - embedded discontinuities**	NDT is to be carried out by qualified operators capable of ensuring that welds are substantially free from significant indications	Radiography and ultrasonic testing, review of documents and patrol of operator, examination of films	Recommendation 20 and 47		Shipbuilders and recognised standards and Rules as applicable, welding and NDT plans, NDT reports, operator qualifications	not required	Identify workstations where NDT is carried out, e.g. panel line butt welds, castings into hull structure	
								Verify NDT carried out in accordance with approved plans where applicable	
								Verify suitability of NDT methods	
								Verify operators suitably qualified particularly where sub-contractors have been employed	
								Verify that records have been completed and in accordance with recognised standards, e.g. IQI and sensitivity recorded	
								Verify that reports and radiographs have been evaluated correctly by the shipbuilder. Systematic review of radiographs carried out by the surveyor	
								Verify equipment calibration satisfactory and in accordance with manufacturers and recognised standards requirements	
								Verify NDT is carried out according to the acceptable process	

Table 1, Hull Surveyable Items Activities Table, Rev.5

Reference	Shipbuilding function	Survey Requirements for Classification	Survey Method required for Classification	IACS reference *	statutory requirements and relevant reference	Documentation available to classification surveyor during construction	Documentation for ship construction file	Specific activities	Classification society proposals for the project
2	**Steel preparation and fit up:**								
2.1	**surface preparation, marking and cutting**	traceability and acceptability of material, check of steel plates & profiles materials type, scantling identification, testing marks	patrol	Recommendation 47		material certificates, shipbuilder's marking/cutting production documents at the workstage - documents retained at the facility	not required	Verify stockyard storage satisfactory	
								Verify material traceability, e.g. stamping identification against material certification, archiving of records	
								Verify transfer marking after treatment line	
								Verify standard of shotblasting and priming	
								Verify suitability of primer	
								Verify that steel grades can be identified	
								Verify machinery adjusted to maintain within IACS or manufacturers recommendations.	
								Verify accuracy of marking and cutting	
								Verify storage of piece parts.	
2.2	**straightening**	Approval of straightening methods/ procedures against deformation	patrol and review	Recommendation 47		recognised standards, approved procedures	not required	Verify that straightening processes are approved for the grade and type of steel, e.g. tmcp, z plate.	
								Verify that plates and sections are within recognised tolerances	

Table 1, Hull Surveyable Items Activities Table, Rev.5

Reference	Shipbuilding function	Survey Requirements for Classification	Survey Method required for Classification	IACS reference *	statutory requirements and relevant reference	Documentation available to classification surveyor during construction	Documentation for ship construction file	Specific activities	Classification society proposals for the project
2.3	**forming**	Maintain material properties. Acceptance of forming method against unproper deformations	patrol	Recommendation 47		Shipbuilders procedure for hot forming	not required	Verify that temperature control is exercised by the operator.	
								Verify that suitable methods of temperature control are available when forming special steels and materials	
								Verify that forming processes are acceptable	
2.4	**conformity with alignment/fit up/gap criteria**	Check alignment/fit up/gap against reference standards	patrol	Recommendation 47		Shipbuilders and recognised standards and Rules as applicable,	not required	Verify the processes to ensure satisfactory fit up and alignment at all workstations	
								Verify that edge preparations are re-instated where lost during fitting operations	
								Verify remedial procedures are in place to compensate for wide gaps and alignment deviations	

Table 1, Hull Surveyable Items Activities Table, Rev.5									
Reference	**Shipbuilding function**	**Survey Requirements for Classification**	**Survey Method required for Classification**	**IACS reference ***	**statutory requirements and relevant reference**	**Documentation available to classification surveyor during construction**	**Documentation for ship construction file**	**Specific activities**	**Classification society proposals for the project**
2.5	**conformity for critical areas with alignment/fit up or weld configuration**	Check alignment/fit up/gap against approved drawings	patrol and review	Recommendation 47		Shipbuilders and recognised standards and Rules as applicable, approved plan or standard, builder's records	Approved plans of critical areas if applicable	Verify that the information relevant to the latest approved drawings is available at the workstations	
								Verify the processes to ensure satisfactory fit up and alignment at all workstations	
								Verify that edge preparations are re-instated where lost during fitting operations	
								Verify remedial procedures are in place to compensate for wide gaps and alignment deviations	

Table 1, Hull Surveyable Items Activities Table, Rev.5									
Reference	**Shipbuilding function**	**Survey Requirements for Classification**	**Survey Method required for Classification**	**IACS reference ***	**statutory requirements and relevant reference**	**Documentation available to classification surveyor during construction**	**Documentation for ship construction file**	**Specific activities**	**Classification society proposals for the project**
3	**Steelwork process, e.g. sub assembly, block, grand and mega block assembly, pre-erection and erection, closing plates**	compliance with approved drawings, visual examination of welding and material, check alignment and deformations	patrol of the process and witness of the completed item	Recommendation 47		approved plans, shipbuilders inspection records, Shipbuilders and recognised standards and Rules as applicable, construction plan (steelwork sub-division)		Verify that the information relevant to the latest approved drawings is available at the workstations	
								Verify that correct weld sizes have been adopted	
								Verify operation of the welding processes at the different work stages is satisfactory	
								Verify that piece parts are identifiable	
								Verify that fit ups are within recognised tolerances	
								Verify that correct welding requirements specified in reference 1 of this table have been adopted	
								Verify processes for closing plates etc. are acceptable	
								Confirm that steelwork is in accordance with the approved plan	
4	**Remedial work and alteration**	welding, check against deformation, alignment	review records and witness	Recommendation 47		permanent record of shipyard surveyable item		Verify that records have been maintained of significant deviations from the approved plans, for situations such as mis cut openings, re-routing outfit items	

Table 1, Hull Surveyable Items Activities Table, Rev.5									
Reference	**Shipbuilding function**	**Survey Requirements for Classification**	**Survey Method required for Classification**	**IACS reference ***	**statutory requirements and relevant reference**	**Documentation available to classification surveyor during construction**	**Documentation for ship construction file**	**Specific activities**	**Classification society proposals for the project**
								Verify that all deviations brought to the attention of the classification society by the shipbuilder are acceptable	
5	**Tightness testing, including leak and hose testing, hydropneumatic testing**	Absence of leaks	Review and witness of the test	UR S14	Reg. II-1/11 of SOLAS as amended;	approved tank testing plan, shipbuilders inspection records	approved tank testing plan	Confirm that tank testing is carried out in accordance with the approved plan	
								Confirm the methods used to carry out leak testing	
								Confirm that correct test pressures maintained for leak, hose and hydro and hydropneumatic testing is satisfactory	
								Verify that adequate records of the tank testing have been maintained	
6	**Structural testing**	structural adequacy of the design	Review and witness of the test	UR S14	Reg. II-1/11 of SOLAS as amended;	approved tank testing plan, shipbuilders inspection records	approved tank testing plan	Confirm that tank testing is carried out in accordance with the approved plan	
								Confirm that correct test pressures maintained for testing is satisfactory	
								Verify that adequate records of the tank testing have been maintained	

Table 1, Hull Surveyable Items Activities Table, Rev.5									
Reference	**Shipbuilding function**	**Survey Requirements for Classification**	**Survey Method required for Classification**	**IACS reference ***	**statutory requirements and relevant reference**	**Documentation available to classification surveyor during construction**	**Documentation for ship construction file**	**Specific activities**	**Classification society proposals for the project**
7	**corrosion protection systems, e.g. coatings, cathodic protection, impressed current except for coating system subject to PSPC**	Salt water ballast tanks with boundaries formed by the hull envelope, and also bulk carrier hold internal surfaces, coamings and hatch covers shall have an efficient protective coating. Safety aspects of cathodic systems to be dealt with separately.	Review and report on builder's & manufacturer's documentation	UR Z 8 and Z 9, UI SC122, UR F1	Reg. II-1/3-2 of SOLAS as amended;	manufacturer's and builder's specification	corrosion protection specifications	Verify that applied coatings are approved and review records of application	
								Verify that adequate records have been maintained and copied to the ship construction file	
	Application Antifouling Systems		Review		AFS Convention	Painting Specification	Paint Specification and Mfg Declaration	Verify that adequate records have been maintained and copied to the ship construction file	
7.1	**Application of Protective Coatings for Dedicated Seawater Ballast Tanks in all Types of Ships and Double-Side Skin Spaces of Bulk Carriers subject to PSPC**	monitor implementation of the coating inspection requirements	Patrolling and Review	UI SC223	Reg. II-1/3-2 of SOLAS as amended;	Signed and Verified Tripartite Agreement	Coating Technical File	Verify that applied coatings are approved and review records of application in accordance with Chapter 7 of Annex to MSC.215(82).	
8	**Installation, welding and testing of the following:**								
8.1	**hatch covers**	tightness and securing	witness	UR S14 & Rec 14	Reg. 13-14-15 and 16 of ILLC '66	approved tank testing plan, shipbuilders inspection records	details required, structural drawings	Confirm leak test of hatch covers	
								Confirm operation and securing test	

Table 1, Hull Surveyable Items Activities Table, Rev.5									
Reference	**Shipbuilding function**	**Survey Requirements for Classification**	**Survey Method required for Classification**	**IACS reference ***	**statutory requirements and relevant reference**	**Documentation available to classification surveyor during construction**	**Documentation for ship construction file**	**Specific activities**	**Classification society proposals for the project**
8.2	**doors and ramps integral with the shell and bulkheads**	tightness and securing	witness	UR S14	Reg. II-1/18 of SOLAS as amended; Reg. 12 and 21 of ILLC '66	approved tank testing plan, shipbuilders inspection records	details required	Confirm leak test	
								Confirm operation and securing test	
								Confirm safety device operation	
								Ensure correct maintenance logs/manuals supplied with the ship construction file	
8.3	**rudders**	fitting	witness	UR S14		approved plan, shipbuilders inspection records	details required, structural drawings	Confirm alignment and mounting and fitting up to the connection to the tiller	
								Confirm function test	
								Verify fitting of pintles and all securing bolts	
								Verify all fit up records including all clearances maintained and placed into ship construction file	

Table 1, Hull Surveyable Items Activities Table, Rev.5									
Reference	**Shipbuilding function**	**Survey Requirements for Classification**	**Survey Method required for Classification**	**IACS reference ***	**statutory requirements and relevant reference**	**Documentation available to classification surveyor during construction**	**Documentation for ship construction file**	**Specific activities**	**Classification society proposals for the project**
8.4	**forgings and castings**	compliance with approved drawings, visual examination of welding and material, check alignment and deformations	patrol of the process and witness of the completed item	UR W7 & W8		approved plans, shipbuilders inspection records, Shipbuilders and recognised standards and Rules as applicable, construction plan (steelwork sub-division)	copies of certificates of forgings and castings	Verify casting and forgings against material certificate	
								Verify that correct welding and fit up requirements specified in reference 1, 2.4 and 2.5 of this table have been adopted	
								Verify that material certificates are included in the ship construction file	
	appendages							Verify that correct welding and fit up requirements specified in reference 1, 2.4 and 2.5 of this table have been adopted	

Table 1, Hull Surveyable Items Activities Table, Rev.5									
Reference	**Shipbuilding function**	**Survey Requirements for Classification**	**Survey Method required for Classification**	**IACS reference ***	**statutory requirements and relevant reference**	**Documentation available to classification surveyor during construction**	**Documentation for ship construction file**	**Specific activities**	**Classification society proposals for the project**
8.5	**equipment forming the watertight and weathertight integrity of the ship, e.g. overboard discharges, air pipes, ventilators**	tightness and securing	witness		Reg. II-1/16 and Reg. II-1/16-1 of SOLAS as amended; Reg. 17-18-19-20-22-23 of ILLC '66	approved tank testing plan, shipbuilders inspection records	details required	Verify that correct welding and fit up requirements specified in reference 1, 2.4 and 2.5 of this table have been adopted	
								Verify Compliance with Load line Convention 1966 as amended - i.e. all fittings in accordance with the record of freeboard assignment	
				UR P3				Verify air pipes, vents etc closing device are approved type	
								Verify material certificates for overboard discharges where applicable	
								Verify record of freeboard assignment and all material certificates included in the ship construction file	
	Freeboard marks and draft marks	within allowable tolerances and in accordance with the freeboard assignment	witness	UI LL4	Reg. 4- 5- 6- 7 and 8 of ILLC '66		details required	Verify freeboard marks in accordance with load line assignment	
								Verify draft marks in accordance with the agreed tolerances specified by the builder unless more onerous flag state requirements	

Table 1, Hull Surveyable Items Activities Table, Rev.5									
Reference	**Shipbuilding function**	**Survey Requirements for Classification**	**Survey Method required for Classification**	**IACS reference ***	**statutory requirements and relevant reference**	**Documentation available to classification surveyor during construction**	**Documentation for ship construction file**	**Specific activities**	**Classification society proposals for the project**
	Principal dimensions	within allowable tolerances	review and witness	Recommendation 47			details required	Verify principal dimensions in accordance with recognised standard	
								Verify dimensions included in ship construction file	
	Safety Construction certification	no outstanding imperfections or defects	witness		Reg. I/7 or Reg. I/10 of SOLAS as amended, as appropriate			Verify that Administration requirements have been incorporated into the hull structure	

Shipbuilder's name	
project	
project duration	
kick off meeting date	
representing builder	
representing class society	

* **IACS Recommendations are not mandatory requirements.**

Table 1 - Hull Surveyable Items Activities Table

Shipbuilder's name	
project	
project duration	
kick-off meeting date	
representing builder	
representing class society	

* IACS Recommendations are not mandatory requirements.

24.11 Ship yard Review Record

Name of Shipyard	Date

24.11.1 Details of any Management Systems

Obtained approval	Certified by	Expiry Date	Remarks (scope etc.)
ISO-9001			
ISO-14001			
ISO-18001			
Other:			

24.11.2 Construction Facilities: Documents such as a brochure of shipyard can be attached in lieu of completing this section.

24.11.2.1 Building Berth (B) or Dock (D)

B/D	Name	Length (m)	Width (m)	Depth* (m)	Building Capacity (Gross Ton.)	Crane (t x No.)

*Incase of berth, Depth is not applicable.

24.11.2.2 Outfitting Quays

Name	Length (m)	Width (m)	Depth* (m)	Berthing Capacity (Gross Ton.)	Crane (t x No.)

24.11.2.2 Main Fabrication and Erection Facilities

1) Marking and cutting of steel plates (including internal members) - Marking method (Manual, Photo x ___, EPM x ___, NC x ___ others _____) - NC cutting machine (Gas x ___, Plasma x ___, Laser x ___) Control procedure of NC (On-line, other) i. Cutting equipment (Edge planer x ___, Roll-shear x ___)
2) Marking and cutting of section bar - Marking method (Manual, NC) - Marking of reference curved line (Manual, NC) - Cutting method (Manual, NC) - In case of NC (Gas x ___, Plasma x ___)
3) One-side automatic welding machine (Yes, No) - Type of welding machine (Flux Backing x ___, Flux and Copper Backing x ___ other _____) - Existence of special surface plate for plate welding (Yes, No)
4) Fillet welding machine (Gravity, Automatic) Percentage of automatization except gravity: about ___% ii. Line Welder (No, Yes: submerged arc x ___ heads, CO2 x ___ heads) iii. Small automatic fillet welding machine (No, Yes: Name: _____ x ___) iv. Welding robot (No, Yes: Portal x ___, Rectangular x ___, Articulated x ___)
5) Painting equipment - Plate shot blasting/primer coating machine (No, Yes: Max. Width ___ m, Length ___ m) - Section bar shot blasting/primer coating machine (No, Yes: Max. Length ___ m) - Special coating factory (No, Yes: ___ m x ___ m x ___ sections)
6) Vertical automatic welding machine (No, Yes: EG x ___, SEG x ___, ES x ___) EG: Electrogas SEG: Simplified Electrogas ES: Electroslag
7) Other main fabrication facilities

24.11.3 Shipyard Control of Qualified Welders

		certification	traceability	supervision	maintenance of qualification
shipyard workers	confirm system in place	Yes / No	Yes / No	Yes / No	Yes / No
Subcontracted workers	confirm system in place	Yes / No	Yes / No	Yes / No	Yes / No

24.11.4 Feature Construction Procedure

i. Subcontract of hull blocks (weight) - Sub members (No, Yes: Ratio of subcontracted works ___ %, No., of subcontractors ___) - Blocks (No, Yes: Ratio of subcontracted works ___ %, No., of subcontractors ___)
2) Method of plate block assembly - Method fitting and welding longitudinals and transverse webs on jointed panels - Method welding longitudinals on jointed panels prior to fitting and welding transverse webs - Method fitting and welding a frame consists of longitudinals and transverse webs on jointed panels - Method jointing panels with pre-assembled longitudinals by welding prior to fitting and welding transverse webs - Other (please specify in (5) below)
3) pre-erection outfitting carried out grand block/mega block adopted Method of erection at building berth/dock - Max. weight of loading block: ton - Construction method in building dock/berth/land construction etc. (1 ship,) 1.5 ships: Semi-tandem, dual entrance - Block loading process (single starting block, multi starting blocks, inserting block: No, Yes)
4) Final dock (No, Yes: In-house, Other place of the same company, Use other company)
5) Other feature of construction procedure

24.11.5 Quality Control System: (Refer to Quality Manual, if available.)

Item and description	**Result**	**Remarks**
1) Existence of the organization chart including the departments of design, purchasing, manufacturing and quality assurance - Are the function, responsibility and competence of the organization clear?		
2) Quality control organization - Existence of quality control organization - Number of employees in this organization - Existence of procedures or plans related to tests and inspections	_____ persons including the chief	
3) Pre-inspection system of shipyard - Is pre-inspection carried out prior to Class inspection? - Are pre-inspectors assigned? (Check the list.) - Number of pre-inspectors (related to hull only) - Are inspection results marked on the object and/or recorded in the checklist?	_____ persons	
4) Records of inspections and tests - Are records made and kept properly? - Does the responsible person verify the records? - Can the adoption of necessary corrective actions against non-conformity happened be checked?		
5) Condition at the time of the surveys in the presence of class surveyors - Is the schedule of the surveys changed often? - Are pre-inspection, shipyard inspection and repairs completed beforehand? - Are the sufficient preparations for surveys such as scaffoldings, lighting, cleaning made?		
Note: Above-mentioned (3) and (4) include the acceptance inspection of subcontracted items.		

24.11.6 Measures for Safety and Health

Item and description	**Result**	**Remarks**
1) Are conditions of scaffolding, nets, safety belt, lighting and ventilation good?		
2) Does sufficient attention paid for radiographic examination and operation of cherry picker?		
Note:		

24.11.7 Control System of Non-Destructive Examination (NDE)

Item and description	**Result**	**Remarks**
1) Number of NDE supervisors in shipyard (including persons responsible for judging results)	_____ persons	
2) Dependence on subcontracted NDE work - Number of shipyard employees - Number of sub-contractors	 _____ persons _____ persons	
3) NDE sub-contractor company's name and official technical qualifications	Name _____ (approved by) _____ Name _____ (approved by) _____	
4) Grade and number of NDE employees with official technical qualifications in shipyard Specialised in radiography Specialised in ultrasonic Specialised in surface detection	 _____ Grade _____ persons _____ Grade _____ persons _____ Grade _____ persons	
5) If non-destructive examinations are subcontracted, the grade and number of officially qualified persons Specialised in radiography Specialised in ultrasonic Specialised in surface detection	 _____ Grade _____ persons _____ Grade _____ persons _____ Grade _____ persons	
6) Non-destructive examination equipment (in house) - Number of radiographic equipment - Number of ultrasonic equipment	 _____ _____	
Note: Even if all works are subcontracted, it is recommendable to attach the qualified person(s) who can verify the works.		

24.11.8 Quality Control on Production Line

Item and description	**Result**	**Remarks**
Preventive measures for misuse of materials		
1) Job title of supervisor and person in charge of collating ordered steel and received steel, and checking of mill sheet	Title of supervisor: _____ Title of person in charge: _____	
2) Are means for checking the material grade in hand prescribed for high-grade steels		
3) Are regulations prescribed for checking the material grade for high-tensile steel for low-temperature applications? Are there regulations for inscribing high tensile steel on the surface of the high tensile steel and special indication for steel for low temperature applications?		
4) Are procedures for re-using of remaining cut-off mild steel?		
5) Are there procedures for re-using of remaining cut-off high-tensile steel?		
6) In the case of (4) and (5) above, can a collation be made with the mill sheet?		
7) Section of controlling the lists of remaining cut-off steel	Name of section: _____	
Notes: - In case of high tensile steel, are means identifying different grades - In the case of (3) and (4) above, are the materials approved by other classes controlled similarly?		
Shot blasting/Primer coating		
1) Existence of surface preparation standards		
2) Existence of coating thickness control standards - Existence of thickness measurement records		
Note: - The standard is to include the description related traceability after shot blasting and primer coating.		
Marking and cutting (assembly work)		
1) Existence of standards for accuracy and periodical inspection of tape measures, tapes, stencils, etc.		
2) Existence of standards for accuracy of cut dimensions and edge preparation		

Item and description	Result	Remarks
3) Existence of standards for finish of cutting face		
4) What is the frequency and extent of maintenance and inspection carried out for ensuring accuracy of NC cutter and/or flame planer?		
5) In case of NC, are the disks, tapes etc. maintained in good condition?		
6) What are the measures adopted and guidance given to make the worker fully conversant with cutting work standards for maintaining accuracy?		
Notes: - In case of (2) and (3) above, check items are to include confirmation of edge preparations free from piercing hole. - NC for section bars is also to be in accordance with the above.		
Bending and strain free		
1) Existence of standards for maximum heating temperatures during water cooling and at the time of bending and distortion removal of steel by quick heating and cooling		
2) Existence of regulations for plate thickness and bending radius for flange processing		
3) What are the measures adopted and guidance given to make the worker fully conversant with maintaining quality and accuracy during the bending process?		
Note:		
Control of welding procedure		
1) Are all welding procedures applied to the ships approved by the Society or other IACS members?		
Note:		
Treatment of serious non-conformities		
1) Are repair plans submitted to the Society when serious non-conformities happened?		
2) Were the NDE (RT/UT) plans submitted at appropriate timing?		
3) Was the extent of tests extended considering the results of the test?		
Note:		

Item and description	Result	Remarks
Hydrostatic and watertight tests		
1) Is the test plan submitted to DBS?		
2) Are vacuum tests applied to?		
3) Are local air injection tests during sub-assembly works applied to?		
4) If (2) or (3) above is applied to, are the test procedures approved by DBS?		
Note:		

24.12 Requirements for Tankers and Bulk Carriers subject to SOLAS Chapter II-1 Part A-1 Regulation 3-10 Goal-based ship construction standards for bulk carriers and oil tankers.

24.12.1 Examination and test plan for newbuilding activities

24.12.1.2 The shipbuilder is to provide plans of the items which are intended to be examined and tested in accordance with DBS Rules in a document known as the Survey Plan, taking into account the ship type and design. This Survey Plan shall be reviewed at the time of the kick off meeting, and must include:

- a set of requirements, including specifying the extent and scope of the construction survey(s) and identifying areas that need special attention during the survey(s), to ensure compliance of construction with mandatory ship construction standards including
  - Types of surveys (visual, non-destructive examination, etc.) depending on location, materials, welding, casting, coatings, etc.
  - Establishment of a construction survey schedule for all assembly stages from the kick-off meeting, through all major construction phases, up to delivery.
  - Inspection/survey plan, including provisions for critical areas identified during design approval.
  - Inspection criteria for acceptance.
  - Interaction with shipyard, including notification and documentation of survey results.
  - Correction procedures to remedy construction defects.
  - List of items that would require scheduling or formal surveys.
  - Determination and documentation of areas that need special attention throughout ship's life, including criteria used in making the determination.
- a description of the requirements for all types of testing during survey, including test criteria.

24.12.2 Design Transparency

24.12.2.1 For ships subject to compliance with IMO Res. MSC.287(87), IMO Res. MSC.290(87), IMO Res. MSC.296(87) and IMO MSC.1/Circ.1343, readily available documentation is to include the main goal-based parameters and all relevant design parameters that may limit the operation of the ship.

24.12.2.2 Ship Construction File (SCF)

24.12.2.3 A Ship Construction File (SCF) with specific information on how the functional requirements of the Goal-based Ship Construction Standards for Bulk Carriers and Oil Tankers have been applied in the ship design and construction is to be provided upon delivery of a new ship, and kept on board the ship and/or ashore and updated as appropriate throughout the ship's service. The contents of the Ship Construction File are to conform to the requirements below.

24.12.2.4 The following design specific information is to be included in the Ship Construction File (SCF):

- Areas requiring special attention throughout the ship's life. (including critical structural areas).
- All design parameters limiting the operation of a ship.
- Any alternatives to the rules, including structural details and equivalency calculations.

- "As built" drawings and information which are verified to incorporate all alterations approved by the recognized organization or flag State during the construction process including scantling details, material details, location of butts and seams, cross section details and locations of all partial and full penetration welds.
- Net (renewal) scantlings for all the structural constituent parts, as built scantlings and voluntary addition thicknesses.
- Minimum hull girder section modulus along the length of the ship which has to be maintained throughout the ship's life, including cross section details such as the value of the area of the deck zone and bottom zone, the renewal value for the neutral axis zone.
- A listing of materials used for the construction of the hull structure, and provisions for documenting changes to any of the above during the ship's service life.
- Copies of certificates of forgings and castings welded into the hull (**Part 2, Ch. 1 &2**).
- Details of equipment forming part of the watertight and weather tight integrity of the ship.
- Tank testing plan including details of the test requirements (S 14).
- Details for the in-water survey, when applicable, information for divers, clearances measurements instructions etc., tank and compartment boundaries.
- Docking plan and details of all penetrations normally examined at drydocking.
- Coating Technical File, for ships subject to compliance with the IMO Performance Standard for Protective Coatings (PSPC).

24.12.2.5 PSPC for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers, adopted by IMO Res. MSC 215(82), as amended and Performance standard for protective coatings for cargo oil tanks of crude oil tankers, adopted by IMO Res. MSC 288(87), as amended.

24.12.2.6 Refer to Table 2 of this Section for details of information to be further included. This information has to be kept on board the ship and/or ashore and updated as appropriate throughout the ship's life in order to facilitate safe operation, maintenance, survey, repair and emergency measures.

24.12.2.7 It is to be noted that parts of the content of the SCF may be subject to various degrees of restricted access and that such documentation may be appropriately kept ashore.

24.12.2.8 The SCF has to include the list of documents constituting the SCF and all information listed in Table A of this Appendix, which is required for a ship's safe operation, maintenance, survey, repair and in emergency situations. Details of specific information that is not considered to be critical to safety might be included directly or by reference to other documents.

24.12.2.9 When developing an SCF, all of the columns in Table 2 of this Section have to be reviewed to ensure that all necessary information has been provided.

24.12.2.10 It may be possible to provide information listed in the annex under more than one Tier II1 functional requirement as a single item within the SCF, for example, the Coating Technical File required by the PSPC2 is relevant for both "Coating life" and "Survey during construction".

24.12.2.11 The SCF has to remain with the ship and, in addition, be available to its classification society and flag State throughout the ship's life. Where information not considered necessary to be on board is stored ashore, procedures to access this information should be specified in the onboard SCF. The intellectual property provisions within the SCF should be duly complied with the SCF should be updated throughout the ship's life at any major event, including, but not limited to, substantial repair and conversion, or any modification to the ship structure.

24.12.2.12 The SCF should be updated throughout the ship's life at any major event, including, but not limited to, substantial repair and conversion, or any modification to the ship structure.

24.12.2.13 The SCF shall be reviewed (refer to 24.12.2.16), at the time of new building, in accordance with the requirements of paragraphs 24.12.2.4 and 24.12.2.5 and the normal storage location shall be distinguished.

24.12.2.14 For the SCF stored on board ship, the surveyor is to verify that the information is placed on board the ship, upon completion of ship construction.

24.12.2.15 For the SCF stored on shore archive, the surveyor is to verify that the information is stored on shore archive by examining the list of information included on shore archive, upon completion of ship construction.

24.12.2.16 Review" means the examination of the SCF that is carried out by the surveyor, at the end of the newbuilding process, in order to confirm that:

- drawings and documents required under the paragraphs 24.12.2.2 to 24.12.15, and

- the possible additional drawings/documents provided by the shipyard, as per the Ship Constructional File (SCF) list of drawings/documents are present in the copies of the SCF stored on board and in the ashore archive.

The "review" is not to be intended as an assessment of the drawings/documents in order to verify their compliances with the applicable Rules/Regulations.

24.12.3 Determination of number of Surveyor(s)

24.12.3.1 Dromon will assign adequate number of suitable qualified surveyor(s) for new building projects according to the construction progress of each ship to meet appropriate coverage of the examination and testing activities as agreed in the Survey Plan.

Tier II items		Information to be included	Further explanation of the content	Example documents	Normal storage location
DESIGN					
1	Design life	• assumed design life in years	• statement or note on midship section	• SCF-specific	on board ship
				• midship section plan	on board ship
2	Environmental conditions	• assumed environmental conditions	• statement referencing data source or Rule (specific rule and data) or; • in accordance with Rule (date and revision)	• SCF-specific	on board ship
3	Structural strength				
3.1	General design	• applied Rule (date and revision)	• applied design method alternative to Rule and subject structure(s)	• SCF-specific	on board ship
		• applied alternative to Rule		• capacity plan	on board ship
3.2	Deformation and failure modes	• calculating conditions and results;	• allowable loading pattern	• loading manual	on board ship
		• assumed loading conditions	• maximum allowable hull girder bending moment and shear force	• trim and stability booklet	on board ship
3.3	Ultimate strength	• operational restrictions due to structural strength	• maximum allowable cargo density or storage factor	• loading instrument instruction manual	on board ship
				• operation and maintenance manuals	on board ship
3.4	Safety margins	• strength calculation results	• bulky output of strength calculation	• strength calculation	on shore archive
			• plan showing highly stressed areas (e.g. critical structural areas) prone to yielding and/or buckling	• areas prone to yielding and/or buckling	on board ship
		• gross hull girder section modulus			
		• minimum hull girder section modulus along the length of the ship to be maintained throughout the ship's life, including cross section details such as the value of the area of the deck zone and		• general arrangement plan	on board ship

Tier II items		Information to be included	Further explanation of the content	Example documents	Normal storage location
		bottom zone, the renewal value for the neutral axis zone			
		• gross scantlings of structural constituent parts	• structural drawings	• key construction plans	on board ship
		• net scantlings of structural constituent parts, as built scantlings and voluntary addition thicknesses	• rudder and stern frame		
			• structural details of typical members	• rudder and rudder stock plans	on board ship
				• structural details	on board ship
				• yard plans	on shore archive
				• dangerous area plan	on board ship
		• hull form			
			• hull form information indicated in key construction plans	• lines plan	on shore archive
			• hull form data stored within an onboard computer necessary for trim and stability and longitudinal strength calculations	or	
				equivalent	on board ship
4	Fatigue life	• applied Rule (date and revision)	• applied design method alternative to Rule and subject structures	• SCF-specific	on board ship
		• applied alternative to Rule			
		• calculating conditions and results;	• assumed loading conditions and rates	• structural details	on board ship
		• assumed loading conditions			
		• fatigue life calculation results	• bulky output of fatigue life calculation	• fatigue life calculation	on shore archive
			• plan showing areas (e.g. critical structural areas) prone to fatigue	• areas prone to fatigue	on board ship
5	Residual strength	• applied Rule (date and revision)		• SCF-specific	on board ship

Tier II items		Information to be included	Further explanation of the content	Example documents	Normal storage location
6	Protection against corrosion				
6.1	Coating life	• coated areas and target coating life and other measures for corrosion protection in holds, cargo and ballast tanks, other structure-integrated deep tanks and void spaces	• plans showing areas (e.g. critical structural areas) prone to excessive corrosion	• SCF-specific	on board ship
6.2	Corrosion addition			• Coating Technical File required by PSPC (Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-side skin spaces of bulk carriers, adopted by IMO Resolution MSC.215(82), as amended and Performance standard for protective coatings for cargo oil tanks of crude oil tankers, adopted by IMO Resolution MSC.288(87), as amended)	on board ship
		• specification for coating and other measures for corrosion protection in holds, cargo and ballast tanks, other structure-integrated deep tanks and void spaces		• areas prone to excessive corrosion	on board ship
		• gross scantlings of structural constituent parts		• key construction plans	on board ship
		• net scantlings of structural constituent parts, as built scantlings and voluntary addition thicknesses			
7	Structural redundancy	• applied Rule (date and revision)		• SCF-specific	on board ship
8	Watertight and weathertight integrity	• applied Rule (date and revision)		• SCF-specific	on board ship
		• key factors for watertight and weathertight integrity	• details of equipment forming part of the watertight and weathertight integrity	• structural details of hatch covers, doors and other closings integral with the shell and bulkheads	on board ship
9	Human element considerations	• list of ergonomic design principles applied to ship structure design to enhance safety during operations, inspections and maintenance of ship		• SCF-specific	on board ship
10	Design transparency	• applied Rule (date and revision) • applicable industry standards for design transparency and IP protection		• intellectual property provisions	on board ship
		• reference to part of SCF information kept ashore		• summary, location and access procedure for part of SCF information on shore	on board ship

Tier II items		Information to be included	Further explanation of the content	Example documents	Normal storage location
CONSTRUCTION					
11	Construction quality procedures	• applied construction quality standard	• recognized national or international construction quality standard	• SCF-specific	on board ship
12	Survey during construction	• survey regime applied during construction (to include all owner and class scheduled inspections during construction)	• applied Rules (date and revision) • copies of certificates of forgings and castings welded into the hull	• SCF-specific • tank testing plan	on board ship on board ship
		• information on non-destructive examination		• non-destructive testing plan	on board ship
				• Coating Technical File required by PSPC	on board ship
IN-SERVICE CONSIDERATIONS					
13	Survey and maintenance	• maintenance plans specific to the structure of the ship where higher attention is called for	• plan showing highly stressed areas (e.g. critical structural areas) prone to yielding, buckling, fatigue and/or excessive corrosion	• SCF-specific • operation and maintenance manuals (e.g. hatch covers and doors)	on board ship on board ship
		• preparations for survey	• arrangement and details of all penetrations normally examined at dry-docking	• docking plan	on board ship
		• gross hull girder section modulus	• details for dry-docking	• dangerous area plan	on board ship
		• minimum hull girder section modulus along the length of the ship to be maintained throughout the ship's life, including cross section details such as the value of the area of the deck zone and bottom zone, the renewal value for the neutral axis zone	• details for in-water survey	• Ship Structure Access Manual	on board ship
				• Means of access to other structure-integrated deep tanks	on board ship
				• Coating Technical File required by PSPC	on board ship
		• gross scantlings of structural constituent parts		• key construction plans	on board ship
		• net scantlings of structural constituent parts, as built		• rudder and rudder stock	on board ship

Tier II items		Information to be included	Further explanation of the content	Example documents	Normal storage location
		scantlings and voluntary addition thicknesses			
				• structural details	on board ship
				• yard plans	on shore archive
			• hull form information indicated in key construction plans	• lines plan	on shore archive
		• hull form		or	
				equivalent	on board ship
14	Structural accessibility	• means of access to holds, cargo and ballast tanks and other structure-integrated deep tanks	• plans showing arrangement and details of means of access	• Ship Structure Access Manual	on board ship
				• means of access to other structure-integrated deep tanks	on board ship
RECYCLING CONSIDERATIONS					
15	Recycling	• identification of all materials that were used in construction and may need special handling due to environmental and safety concerns	• list of materials used for the construction of the hull structure	• SCF-specific	on board ship

Table A - List of Information to be Included in the Ship Construction File (SCF)

Notes:

1. "SCF-specific" means documents to be developed especially to meet the requirements of these GBS guidelines (MSC.1/Circ.1343).
2. "Key construction plans" means plans such as midship section, main O.T. and W.T. transverse bulkheads, construction profiles/plans, shell expansions, forward and aft sections in cargo tank (or hold) region, engine-room construction, forward construction and stern construction drawings.
3. "Yard plans" means a full set of structural drawings, which include scantling information of all structural members.
4. "Hull form" means a graphical or numerical representation of the geometry of the hull. Examples would include the graphical description provided by a lines plan and the numerical description provided by the hull form data stored within an onboard computer.
5. "Lines plan" means a special drawing which is dedicated to show the entire hull form of a ship.
6. "Equivalent (to Lines plan)" means a set of information of hull form to be indicated in key construction plans for SCF purposes. Sufficient information should be included in the drawings to provide the geometric definition to facilitate the repair of any part of the hull structure.
7. "Normal storage location" means a standard location where each SCF information item should be stored. However, those items listed as being on board in the table above should be on board as a minimum to ensure that they are transferred with the ship on a change of owner.
8. "Shore archive" is to be operated in accordance with applicable international standards.

Section 25 – Damage and repair surveys

25.1 General requirements

25.1.1 Damage surveys are occasional surveys, which are, in general, outside the programme of periodical hull surveys and are requested because of hull damage or other defects.

25.1.2 It is the responsibility of the owner or owner's representative to inform the DBS Society concerned when such damage or defect could impair the structural capability or watertight integrity of the hull. The damages should be inspected and assessed by the DBS Surveyors and the relevant repairs, if needed, are to be performed.

25.1.3 In certain cases, depending on the extent, type and location of the damage, permanent repairs may be deferred to coincide with the planned periodical survey.

25.1.4 Any damage in association with wastage over the allowable limits (including buckling, grooving, detachment or fracture), or extensive areas of wastage over the allowable limits, which affects or, in the opinion of the Surveyor, will affect the vessel's structural watertight or weathertight integrity, is to be promptly and thoroughly repaired. Areas to be considered to are to include:

- bottom structure and bottom plating;
- side structure and side plating;
- deck structure and deck plating;
- watertight or oiltight bulkheads.

25.1.5 In cases of repairs intended to be carried out by riding crew during voyage, the complete procedure of the repair, including all necessary surveys, is to be submitted to and agreed upon by the DBS Society reasonably in advance.

25.2 Applicability of the survey

25.2.1 Where repairs to hull, machinery or equipment, which affect or may affect DBS classification, are to be carried out by a riding crew during a voyage they are to be planned in advance.

25.2.2 A complete repair procedure including the extent of proposed repair and the need for DBS surveyor's attendance during the voyage is to be submitted to and agreed upon by the DBS surveyor reasonably in advance.

25.2.3 Failure to notify the DBS Society, in advance of the repairs, may result in suspension of the vessel's class.

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

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

25.3 Voyage Repairs and Maintenance

25.3.1 A meeting is to be held with the owners prior to commencement of hull repairs during a vessel's voyage to discuss and confirm the following:

25.3.1.1 It is the owner's responsibility to ensure continued effectiveness of the structure, including the longitudinal strength and the watertight/weathertight integrity of the vessel.

25.3.1.2 Extent of intended repairs. All repairs to be based on the DBS Society's recommendations and/or concurrence.

25.3.1.3 Availability of pertinent drawings.

25.3.1.4 Verification of new materials regarding certification, grade and scantlings. Verified mill sheets to remain on board and to be provided to attending Surveyor examining completed repairs.

25.3.1.5 Verification of welding consumables regarding certification and suitability for materials involved. Check on availability of drying ovens, holding containers, etc.

25.3.1.6 Verification of the qualification of welders and supervisory personnel, qualification records to remain on board and to be provided to attending Surveyor examining completed repairs.

25.3.1.7 Review of intended repair.

25.3.1.8 Review of the intended provisions to facilitate sound weldments, i.e. cleaning, preheating (if applicable) adherence to welding sequence principles. Further, it might be necessary to restrict welding to certain positions and prohibit welding in more difficult positions when the ship's motions might influence the quality of the welding.

25.3.1.9 Review of the application of repair coating, as appropriate.

25.3.1.10 Review of intended working conditions, i.e. staging, lighting, ventilation, etc.

25.3.1.11 Review of intended supervision and quality control.

25.3.1.12 Completed repairs are to be examined and tested as required to the satisfaction of the attending DBS Surveyor.

Note:
All details and results of subject meeting to be covered by a memorandum. A copy of this memorandum is to be placed on board and to be provided to the attending DBS Surveyor examining repairs. In addition, a copy is to be sent/faxed to the arrival port where completed repairs will be examined.

25.3.2 Any contemplated repairs to primary hull structures, i.e. main longitudinal and transverse members and their attachments, are to be submitted to the DBS Society for review prior to commencing voyage repairs.

25.3.3 Riding repairs to primary hull structures should not be permitted except in extreme circumstances.

25.3.4 Any repairs to primary hull structures shall require attendance by a DBS Surveyor riding-ship survey or at regular intervals to confirm fit-up, alignment, general workmanship and compliance with recommendations.

25.3.5 NDT of completed repairs to primary structure to be carried out to attending DBS Surveyor's satisfaction.

25.3.6 Repairs to other hull structural parts may be accepted based on examination upon completion of repairs.

25.3.7 No hull repairs carried out by a riding crew should be accepted unless:

25.3.7.1 The initial meeting had been carried out and conditions found satisfactory.

25.3.7.2 A final satisfactory examination upon completion was carried out..

Section 26 – Hull Surveys for General Dry Cargo Ships

26.1 General

26.1.1 Application

26.1.1.1 The requirements apply to all self-propelled General Dry Cargo Ships of 500gt and above carrying solid cargoes other than:

- Bulk Carriers and Double Skin Bulk Carriers;
- dedicated container carriers;
- ro-ro cargo ships;
- refrigerated cargo ships;
- dedicated wood chip carriers;
- dedicated cement carriers;
- livestock carriers;
- deck cargo ships
  The requirements of paragraphs 26.2.6 and 26.3.3 also apply to those cargo ships, which, although belonging to the ship types listed above that are excluded from the application of this Section, are fitted with a single cargo hold.
  A deck cargo ship is a ship that is designed to carry cargo exclusively above deck without any access for cargo below deck.
- general dry cargo ships of double-side skin construction, with double-side skin extending for the entire length of the cargo area, and for the entire height of the cargo hold to the upper deck.

26.1.1.2 For General Dry Cargo Ships with hybrid cargo hold arrangements, e.g. with some cargo holds of single-side skin and others of double-side skin, the requirements of this section are to be applied only to structure in way of the single-side skin cargo hold region.

26.1.1.3 The requirements apply to surveys of hull structure and piping systems in way of cargo holds, cofferdams, pipe tunnels, void spaces and fuel oil tanks within the cargo area and all ballast tanks. The requirements are additional to the classification requirements applicable to the remainder of the ship. Refer to section 5 of this chapter.

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

26.1.2 Definitions

Ballast Tank	A Ballast Tank is a tank that is being used primarily for salt water ballast.
Spaces	Spaces are separate compartments including holds and tanks.
Overall Survey	An Overall Survey is a survey intended to report on the overall condition of the hull structure and determine the extent of additional Close-up Surveys.
Close Up Survey	A Close-up Survey is a survey where the details of structural components are within the close visual inspection range of the surveyor, i.e. normally within reach of hand.
Transverse Section	A Transverse Section includes all longitudinal members such as plating, longitudinals and girders at the deck, sides, bottom, inner bottom and hopper side plating, longitudinal bulkheads and bottom plating in top wing tanks. For transversely framed vessels, a transverse section includes adjacent frames and their end connections in way of transverse sections.
Representative Space	Representative Spaces are those which are expected to reflect the condition of other Spaces of similar type and service and with similar corrosion prevention systems. When selecting Representative Spaces account is to be taken of the service and repair history on board and identifiable Critical Structural Areas and/or Suspect Areas.
Critical Structural Area	Critical Structural Areas are locations which have been identified from calculations to require monitoring of from the service history of the subject ship or from similar ships or sister ships, if applicable, to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.

Suspect Area	Suspect Areas are locations showing Substantial Corrosion and/or are considered by the surveyor to be prone to rapid wastage.
Substantial Corrosion	Substantial Corrosion is an extent of corrosion such that assessment of corrosion pattern indicates a wastage in excess of 75% of allowable margins, but within acceptable limits.
Corrosion Prevention System	A Corrosion Prevention System is normally considered a full hard protective coating. Hard Protective Coating is usually to be epoxy coating or equivalent. Other coating systems, which are neither soft nor semi-hard coatings, may be considered acceptable as alternatives provided that they are applied and maintained in compliance with the manufacturer's specifications.
Coating Condition	Coating Condition is defined as follows: **GOOD** condition with only minor spot rusting. **FAIR** condition with local breakdown at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition. **POOR** condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration.
Cargo Length Area	Cargo Length Area is that part of the ship which contains all cargo holds and adjacent areas including fuel tanks, cofferdams, ballast tanks and void spaces.
Special Consideration	Special Consideration or specially considered (in connection with close-up surveys and thickness measurements) means sufficient close-up inspection and thickness measurements are to be taken to confirm the actual average condition of the structure under the coating.
Prompt and Thorough Repair	A Prompt and Through Repair is a permanent repair completed at the time of survey to the satisfaction of the surveyor, therein removing the need for the imposition of any associated condition of classification.
Remote Inspection Techniques (RIT)	Remote Inspection Technique is a means of survey that enables examination of any part of the structure without the need for direct physical access of the surveyor.

26.1.3 Repairs

26.1.3.1 Any damage in association with wastage over the allowable limits (including buckling, grooving, detachment or fracture), or extensive areas of wastage over the allowable limits, which affects or, in the opinion of the Surveyor, will affect the vessel's structural, watertight or weathertight integrity, is to be promptly and thoroughly (see 26.1.2.14) repaired. Areas to be considered include:

- side shell frames, their end attachments and adjacent shell plating;
- deck structure and deck plating;
- bottom structure and bottom plating;
- watertight bulkheads;
- hatch covers and hatch coamings.
- see Ch. 3, Sec.2, par. 2.2.7 to 2.2.9 of this Part.

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

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

26.1.3.3 Where the damage found on structure mentioned in par. 26.1.3.1 is isolated and of a localised nature which does not affect the ship's structural integrity, consideration may be given by the surveyor to allow an appropriate temporary repair to restore watertight or weather tight integrity and impose a Recommendation/Condition of Class in accordance with IACS PR 35, with a specific time limit.

26.1.3.4 Thickness measurements and close-up surveys

26.1.3.4.1 In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by Table 26.2, of structures in areas where close-up surveys are required, shall be carried out simultaneously with close-up surveys.

26.1.3.4.2 Consideration may be given by the attending Surveyor to allow use of Remote Inspection Techniques (RIT) as an alternative to close-up survey. Surveys conducted using a RIT are to be completed to the satisfaction of the attending Surveyor. When RIT is used for a close-up survey, temporary means of access for the corresponding thickness measurements as specified in this Section is to be provided unless such RIT is also able to carry out the required thickness measurements.

26.1.3.5 Remote Inspection Techniques (RIT)

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

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

26.1.3.5.3 When using a RIT as an alternative to close-up survey, if not carried out by the Society itself, it is to be conducted by a firm approved as a service supplier according to Ch 1/Sec 3 of this Part and is to be witnessed by an attending surveyor of DBS.

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

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

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

26.1.3.5.7 Thickness measurements Acceptance Criteria

26.1.3.5.7.1 The acceptance criteria for thickness measurements are according to the Rules of the DBS and/or specific IACS URs depending on ship's age and structural elements concerned, e.g. UR S181 for corrugated transverse bulkhead, UR S21A2 for all cargo hatch covers and coamings on exposed decks

26.2 Special Survey

26.2.1 Schedule

26.2.1.1 Special Surveys are to be carried out at 5 years intervals to renew the Classification Certificate.

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

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

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

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

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

26.2.2 Scope

26.2.2.1 General

i. The Special Survey is to include, in addition to the requirements of the Annual Surveys, examination, tests and checks of sufficient extent to ensure that the hull and related piping, as required in (iii) below, are in a satisfactory condition and fit for the intended purpose for the new period of class of 5 years to be assigned, subject to proper maintenance and operation and to periodical surveys being carried out at the due dates.
ii. All cargo holds, water ballast tanks, including double bottom tanks, pipe tunnels, cofferdams and void spaces bounding cargo holds, decks and outer hull are to be examined, and this examination is to be supplemented by thickness measurement and testing as required in 26.2.4 and 26.2.5, to ensure that the structural integrity remains effective.
iii. The aim of the examination is to discover Substantial Corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.
iv. All piping systems within the above spaces are to be examined and operationally tested to working pressure to attending Surveyor's satisfaction to ensure that tightness and condition remain satisfactory.
v. The survey extent of ballast tanks converted to void spaces is to be specially considered in relation to the requirements for ballast tanks. For survey of automatic air pipes refer to Ch.3, Sec. 4, par. 4.1.20.

26.2.2.2 Dry Dock Survey

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

26.2.2.3 Tank Protection

- Where provided, the condition of corrosion prevention system of ballast tanks is to be examined. For tanks used for water ballast, excluding double bottom tanks, where a hard protective coating is found in POOR condition and it is not renewed, where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from time of construction, the tanks in question are to be examined at annual intervals. Thickness measurements are to be carried out as deemed necessary by the surveyor.
  When such breakdown of hard protective coating is found in water ballast double bottom tanks and it is not renewed, where a soft or semi-hard coating has been applied, or where a hard protective coating was not applied from the time of construction, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.
- Where the hard protective coating in spaces is found to be in a GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered.

26.2.2.4 Hatch Covers and Coamings

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

- A thorough inspection of the items listed in 26.3.2.3 is to be carried out.
- Checking of the satisfactory operation of all mechanically operated hatch covers is to be made, including:
  - stowage and securing in open condition;
  - proper fit and efficiency of sealing in closed conditions:
  - operational testing of hydraulic and power components, wires, chains and link drives.
- Checking the effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent is to be carried out.
- Close-up survey and thickness measurement (Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures) of the hatch cover and coaming plating and stiffeners is to be carried out as given in Table 26.1 and Table 26.2.

26.2.3 Extent of Overall and Close-up Survey

26.2.3.1 An Overall Survey of all tanks and spaces, excluding fuel oil, lube oil and fresh water tanks, is to be carried out at each Special Survey. For fuel oil, lube oil and fresh water tanks, reference is to be made to Ch. 3, Sec. 4 Table 3.

26.2.3.2 The minimum requirements for close-up surveys at special survey are given in Table 26.1.

26.2.3.3 The Surveyor may extend the close-up survey as deemed necessary taking into account the maintenance of the spaces under survey, the condition of the corrosion prevention system and where spaces have structural arrangements or details which have suffered defects in similar spaces or on similar ships according to available information.

26.2.3.4 For areas in spaces where hard protective coatings are found to be in a GOOD condition, the extent of close-up surveys according to Table I may be specially considered. For examination of automatic air pipe heads, reference is to be made to Ch. 3, Sec. 4 Table 4.

26.2.4 Extent of Thickness Measurement

26.2.4.1 The minimum requirements for thickness measurements at Special Survey are given in Table 26.4.

26.2.4.2 The Surveyor may extend the thickness measurements as deemed necessary. When thickness measurements indicate substantial corrosion, the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table 26.3 may be used as guidance for these additional thickness measurements.

26.2.4.3 For areas in spaces where hard protective coatings are found to be in a GOOD condition, the extent of thickness measurement according to Table 26.2 may be specially considered.

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

26.2.5 Extent of Tank Testing

26.2.5.1 All boundaries of water ballast tanks and deep tanks used for water ballast within the cargo length area are to be pressure tested. For fuel oil tanks, the representative tanks are to be pressure tested.

26.2.5.2 The Surveyor may extend the tank testing as deemed necessary.

26.2.5.3 Tank testing of fuel oil tanks is to be carried out with a head of liquid to the highest point that liquid will rise under service conditions. Tank testing of fuel oil tanks may be specially considered based on a satisfactory external examination of the tank boundaries, and a confirmation from the Master stating that the pressure testing has been carried out according to the requirements with satisfactory results.

26.2.6 Additional requirements for single hold cargo ships after determining compliance with SOLAS II-I/23-3 and II-I/25

26.2.6.1 For ships complying with the requirements of SOLAS II-I/23-3 and II-I/25 for hold water level detectors, the special survey is to include an examination and a test of the water ingress detection system and their alarms.

26.3 Annual Survey

26.3.1 Schedule

26.3.1.1 Annual Surveys are to be held within 3 months before or after anniversary date from the date of the initial classification survey or of the date credited for the last Special Survey.

26.3.2 Scope

26.3.2.1 General

26.3.2.1.1 The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull, hatch covers, coamings and piping are maintained in a satisfactory condition.

26.3.2.1.2 Examination of the Hull

i. Examination of the hull plating and its closing appliances as far as can be seen.
ii. Examination of watertight penetrations as far as practicable.

26.3.2.1.3 Examination of weather decks, hatch covers and coamings

i. Confirmation is to be obtained that no unapproved changes have been made to the hatch covers, hatch coamings and their securing and sealing devices since the last survey.
ii. Where mechanically operated steel covers are fitted, checking the satisfactory condition of:
- hatch covers; including close-up survey of hatch cover plating;

- tightness devices of longitudinal, transverse and intermediate cross junctions (gaskets, gasket lips, compression bars, drainage channels);
- clamping devices, retaining bars, cleating;
- chain or rope pulleys;
- guides;
- guide rails and track wheels;
- stoppers, etc.;
- wires, chains, gypsies, tensioning devices;
- hydraulic system essential to closing and securing;
- safety locks and retaining devices.

Where portable covers, wooden or steel pontoons are fitted, checking the satisfactory condition where applicable of:

- wooden covers and portable beams, carriers or sockets for the portable beam, and their securing devices;
- steel pontoons;
- tarpaulins;
- cleats, battens and wedges;
- hatch securing bars and their securing devices;
- loading pads/bars and the side plate edge;
- guide plates and chocks;
- compression bars, drainage channels and drain pipes (if any).

iii. Checking the satisfactory condition of hatch coaming plating and their stiffeners including close-up survey.

iv. Random checking of the satisfactory operation of mechanically operated hatch covers is to be made including:
- stowage and securing in open condition;
- proper fit and efficiency of sealing in closed condition;
- operational testing of hydraulic and power components, wires, chains, and link drives.

For survey of air pipes, flame screens on vents and ventilators refer to Ch.3 Sec. 2., par. 2.2.7 to 2.2.10.

26.3.3 Suspect Areas

Suspect Areas identified at previous surveys are to be examined. Thickness measurements are to be taken of the areas of substantial corrosion and the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table III may be used as guidance for these additional thickness measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

26.3.4 Examination of Cargo Holds

i. For Ships 10-15 years of age, the following is to apply:
   a. Overall Survey of one forward and one after cargo hold and their associated tween deck spaces.
   b. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table III may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

ii. For Ships over 15 years of age, the following is to apply:
   a. Overall Survey of all cargo holds and tween deck spaces.
   b. Close-up examination of sufficient extent, minimum 25% of frames, to establish the condition of the lower region of the shell frames including approx. lower one third length of side frame at side shell and side frame end attachment and the adjacent shell plating in a forward lower cargo hold and one other selected lower cargo hold. Where this level of survey reveals the need for remedial measures, the survey is to be extended to include a Close-up Survey of all of the shell frames and adjacent shell plating of those cargo holds and associated tween deck spaces (as applicable) as well as a Close-up Survey of sufficient extent of all remaining cargo holds and tween deck spaces (as applicable).
   c. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table III may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.
   d. Where the protective coating in cargo holds, as applicable, is found to be in GOOD condition the extent of close-up surveys may be specially considered.
   e. All piping and penetrations in cargo holds, including overboard piping, are to be examined.

26.3.5 Examination of Ballast Tanks

Examination of ballast tanks when required as a consequence of the results of the Special Survey and Intermediate Survey is to be carried out. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements are to be increased to determine the extent of areas of substantial corrosion. Table III may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

26.3.6 Additional requirements for single hold cargo ships after determining compliance with SOLAS II-I/23-3 and II-I/25

26.3.6.1 For ships complying with the requirements of SOLAS II-I/23-3 and II-I/25 for hold water level detectors, the annual survey is to include an examination and a test, at random, of the water ingress detection system and of their alarms.

26.4 Intermediate Survey

26.4.1 Schedule

26.4.1.1 The Intermediate Survey is to be held at or between either the 2nd or 3rd Annual Survey.

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

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

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

26.4.2 Scope

26.4.2.1 General
The survey extent is dependent on the age of the vessel as specified in 26.4.2.2 to 26.4.2.4.

26.4.2.2 Ships 5 - 10 Years of Age, the following is to apply:

i. Ballast tanks
   a. For tanks used for water ballast, an Overall Survey of Representative Tanks selected by the Surveyor is to be carried out. If such overall survey reveals no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains efficient.
   b. Where POOR coating condition, soft or semi-hard coating, corrosion or other defects are found in water ballast tanks or where a hard protective coating was not applied from the time of construction, the examination is to be extended to other ballast tanks of the same type.
   c. In water ballast tanks other than double bottom tanks, where a hard protective coating is found in POOR condition, and it is not renewed, where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from time of construction, the tanks in question are to be examined and thickness measurements carried out as considered necessary at annual intervals. When such breakdown of hard protective coating is found in water ballast double bottom tanks, where a soft or semi-hard coating has been applied, or where a hard protective coating has not been applied, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.
   d. In addition to the requirements above, areas found suspect at previous surveys are to be surveyed in accordance with the provisions indicated in 26.3.2.4

ii. Cargo Holds
   a. An Overall Survey of one forward and one after cargo hold and their associated tween deck spaces.
   b. Areas found suspect at previous surveys are to be surveyed in accordance with the provisions indicated in 26.3.2.4.

26.4.2.3 Ships 10-15 Years of Age, the following is to apply:

i. Ballast Tanks
   a. For tanks used for water ballast, an overall survey of all tanks is to be carried out. If such overall survey reveals no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains efficient.
   b. The requirements of 26.4.2.2 (i) c) and d) also apply.

ii. Cargo Holds
   a. An Overall Survey of all cargo holds and tween deck spaces.
   b. Areas found suspect at previous surveys are to be surveyed in accordance with the provisions indicated in 26.3.2.4.
   c. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then

the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table III may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the survey is credited as completed.

26.4.2.4 Ships over 15 Years of Age, the following is to apply:

i. The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 26.2, except for item 2c) in column 4 of Table 26.2. However, tank testing specified in 26.2.5, survey of automatic air pipe heads and internal examination of fuel oil, lube oil and fresh water tanks (see 26.2.3.1) are not required unless deemed necessary by the attending surveyor.

i. In application of 26.4.2.4 (i), the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of 26.2.1.4.

ii. In lieu of the requirements of 26.2.2.2, an in water survey, according to the provisions of Section 10, may be considered as equivalent.

26.3 Preparation for survey

26.3.1 Conditions of Survey

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

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

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

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

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

26.3.2 Access to Structures

26.3.2.1 For Overall Survey, means are to be provided to enable the surveyor to examine the hull structure in a safe and practical way.

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

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

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

- Unmanned robot arm.
- Remotely Operated Vehicles (ROV).
- Unmanned Aerial Vehicles / Drones.
- Other means acceptable to DBS.

26.3.3 Equipment for Survey

26.3.3.1 Thickness measurement is normally to be carried out by means of ultrasonic test equipment. The accuracy of the equipment is to be proven to the Surveyor as required.

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

- radiographic equipment
- ultrasonic equipment
- magnetic particle equipment

- dye penetrant

26.3.4 Survey at Sea or at Anchorage

26.3.4.1 Survey at sea or at anchorage may be accepted provided the Surveyor is given the necessary assistance from the personnel on board. Necessary precautions and procedures for carrying out the survey are to be in accordance with 26.5.1, 26.5.2, and 26.5.3.

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

26.3.4.3 When boats or rafts are used, appropriate life jackets are to be available for all participants. Boats or rafts are to have satisfactory residual buoyancy and stability even if one chamber is ruptured. A safety checklist is to be provided.

26.3.4.4 Surveys of tanks by means of boats or rafts may only be undertaken at the sole discretion of the Surveyor, who is to take into account the safety arrangements provided, including weather forecasting and ship response in reasonable sea conditions.

26.4 Procedures for thickness measurement

26.4.1 General

26.4.1.1 The required thickness measurements, if not carried out by the Society itself, are to be witnessed by a surveyor of DBS. The surveyor is to be on board to the extent necessary to control the process.

26.4.1.2 The thickness measurement company is to be part of the survey planning meeting to be held prior to commencing the survey.

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

26.4.2 Certification of Thickness Measurement Company

26.4.2.1 The thickness measurements are to be carried out by a company certified by DBS according to principles stated in par. 26.7.

26.4.3 Reporting

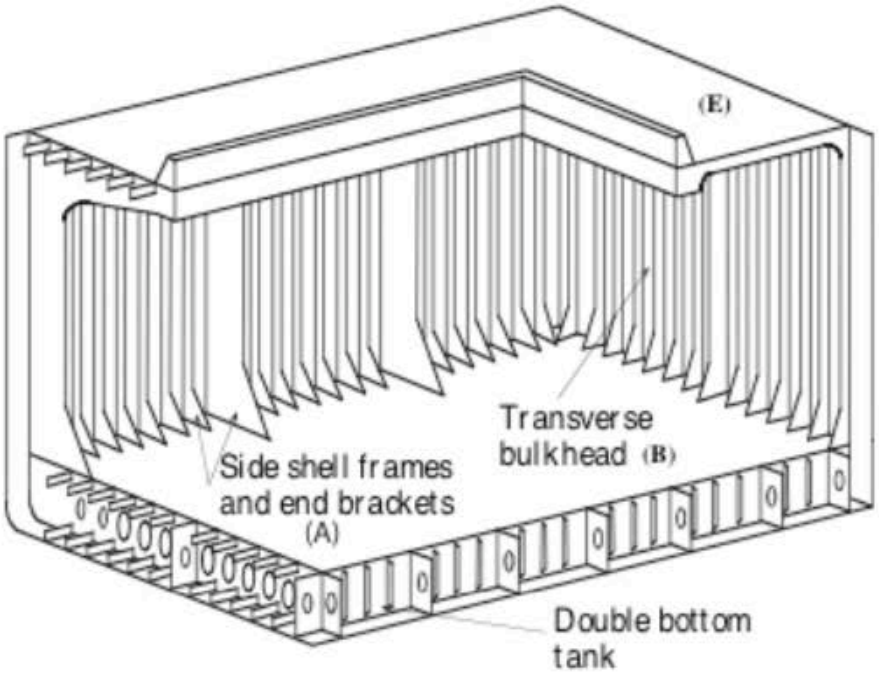
26.4.3.1 A thickness measurement report is to be prepared. The report is to give the location of measurements, the thickness measured as well as corresponding original thickness. Furthermore, the report is to give the date when the measurements were carried out, type of measurement equipment, names of personnel and their qualifications and has to be signed by the operator.

26.4.3.2 The Surveyor is to review the final thickness measurement report and countersign the cover page.

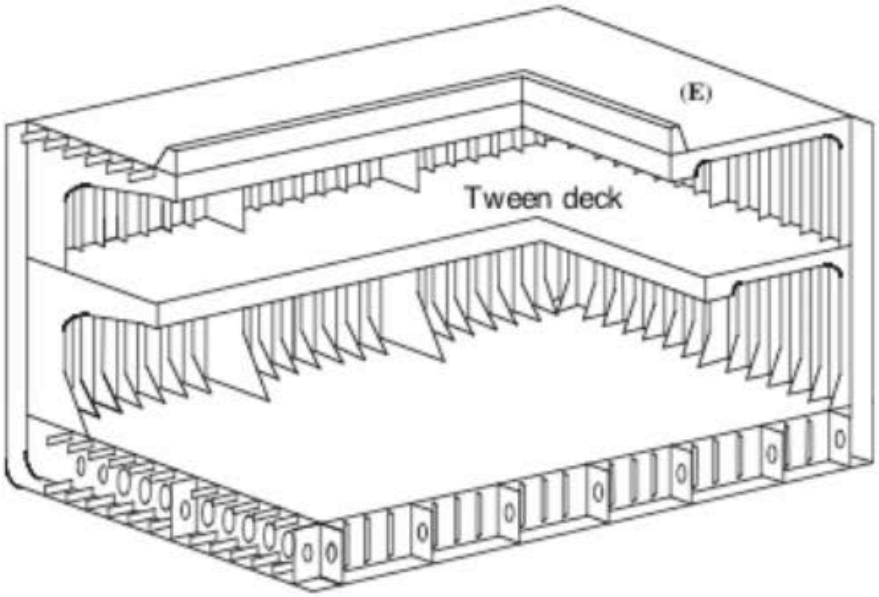
Special Survey No.1 **Age ≤ 5**	**Special Survey No.2** **5 < Age ≤ 10**	**Special Survey No. 3** **10 < Age ≤ 15**	**Special Survey No. 4** **and Subsequent** **Age > 15**
A. Selected shell frames in one forward and one aft cargo hold and associated tween deck spaces. B. One selected cargo hold transverse bulkhead. C. All cargo hold hatch covers and coamings (plating and stiffeners).	A. Selected shell frames in all cargo holds and tween deck spaces. B. One transverse bulkhead in each cargo hold. B. Forward and aft transverse bulkhead in one side ballast tank, including stiffening system.	A. All shell frames in the forward lower cargo hold and 25% frames in each of the remaining cargo holds and tween deck spaces including upper and lower end attachments and adjacent shell plating. B. All cargo hold transverse bulkheads.	A. All shell frames in all cargo holds and tween deck spaces including upper and lower end attachments and adjacent shell plating. Areas (B –F) as for Special Survey No. 3.

	C. One transverse web with associated plating and framing in two representative water ballast tanks of each type (i.e. topside, hopper side, side tank or double bottom tank). D. All cargo hold hatch covers and coamings (plating and stiffeners). E. Selected areas of all deck plating and underdeck structure inside line of hatch openings between cargo hold hatches. F. Selected areas of inner bottom plating.	B. All transverse bulkheads in ballast tanks, including stiffening system. C. All transverse webs with associated plating and framing in each water ballast tank. D. All cargo hold hatch covers and coamings (plating and stiffeners). E. All deck plating and underdeck structure inside line of hatch openings between cargo hold hatches. G. All areas of inner bottom plating.	
A. Cargo hold transverse frames. B. Cargo hold transverse bulkhead plating, stiffeners and girders. C. Transverse web frame or watertight transverse bulkhead in water ballast tanks. D. Cargo hold hatch covers and coamings. Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures. E. Deck plating and underdeck structure inside line of hatch openings between cargo hold hatches. F. Inner bottom plating. See Figures 26.1 and 26.2 for the areas corresponding to A, B, C, D, E and F. Note: Close-up survey of cargo hold transverse bulkheads to carried out at the following levels: ▪ Immediately above the inner bottom and immediately above the tween decks, as applicable. ▪ Mid-height of the bulkheads for holds without tween decks. ▪ - Immediately below the main deck plating and tween deck plating.			

Table 26.1: Table of the minimum requirements for close-up survey at hull special surveys of General Dry Cargo ships.



(a) Single Deck Ship



(b) Tween Deck Ship

Figure 26.1: Areas for close-up survey of General Dry Cargo Ships.

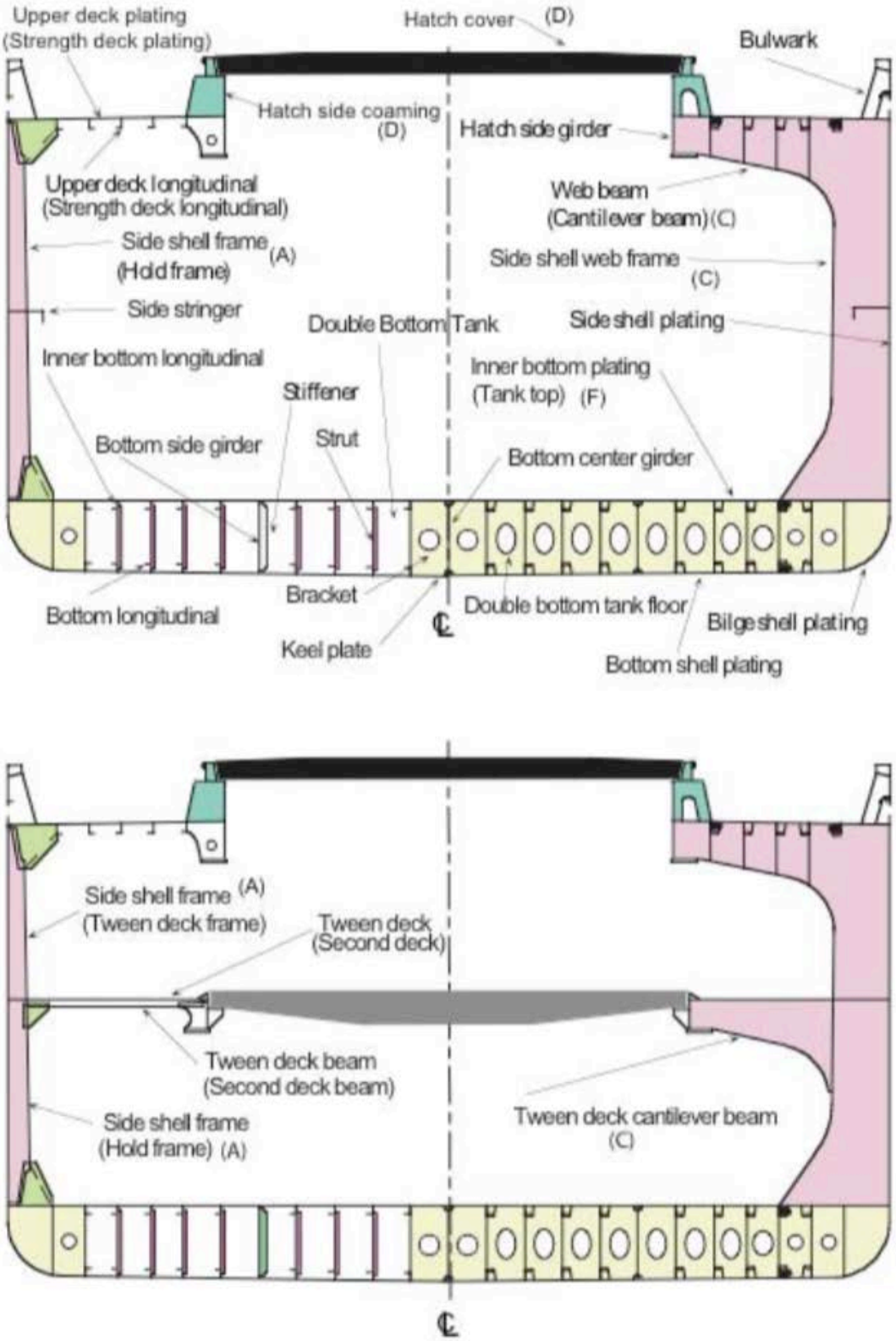


Figure 26.2: Areas for close-up survey of General Dry Cargo Ships.

Special Survey No.1 **Age ≤ 5**	**Special Survey No.2** **5 < Age ≤ 10**	**Special Survey No. 3** **10 < Age ≤ 15**	**Special Survey No. 4 and Subsequent** **Age > 15**
1. Suspect areas.	1. Suspect areas. 2. One transverse section of deck plating in way of a cargo space within the amidships 0.5L. 3. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table 26.1.	1. Suspect areas. 2. Two transverse sections within the amidships 0.5L in way of two different cargo spaces. 3. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table 26.1. 4. Within the cargo length area, each deck plate outside line of cargo hatch openings. 5. All wind and water strakes within the cargo length area. 6. Selected wind and water strakes outside the cargo length area.	1. Suspect areas. 2. Within the cargo length area: a. a minimum of three transverse sections within the amidships 0.5L. b. each deck plate outside line of cargo hatch openings. c. each bottom plate, including lower turn of bilge. d. duct keel or pipe tunnel plating and internals. 3. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table 26.1. 4. All wind and water strakes full length

Notes:
1. Thickness measurement locations should be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering cargo and ballast history and arrangement and condition of protective coatings.
2. For ships less than 100 m in length, the number of transverse sections required at Special survey No. 3 may be reduced to one and the number of transverse sections at Special Survey No. 4 and subsequent surveys may be reduced to two.

Table 26.2: Table of the minimum requirements for the thickness measurment at hull special surveys of General Dry Cargo ships.

Structural Member	**Extent of Measurement**	**Pattern of Measurement**
Palting	Suspect area and adjacent plates.	5 point pattern over 1 square meter.
Stiffeners	Suspect area.	3 measurements each in line across web and flange.

Table 26.3: Guidance for additional thickness measurements in way of substantial corrosion.

26.5 Procedures for certification of firms engaged in thickness measurement of hull structures

26.5.1 Application

This guidance applies for certification of the firms which intend to engage in the thickness measurement of hull structures of the vessels.Ch 1/Sec 3 of this Part also applies.

26.5.2 Procedures for Certification

26.5.2.1 Submission of Documents:

Following documents are to be submitted to DBS for approval;

a. Outline of firms, e.g. organization and management structure.
b. Experiences of the firms on thickness measurement inter alia of hull structures of the vessels.
c. Technicians careers, i.e. experiences of technicians as thickness measurement operators, technical knowledge of hull structure etc. Operators, are to be qualified according to a recognized industrial NDT Standard.
d. Equipment used for thickness measurement such as ultra-sonic testing machines and its maintenance/calibration procedures.
e. A guide for thickness measurement operators.
f. Training programmes of technicians for thickness measurement.

26.5.2.2 Auditing of the firms:

Upon reviewing the documents submitted with satisfactory results, the firm is audited in order to ascertain that the firm is duly organised and managed in accordance with the documents submitted, and eventually is capable of conducting thickness measurement of the hull construction of the ships.

26.5.2.3 Certification is conditional on an onboard demonstration at thickness measurements as well as satisfactory reporting.

26.5.3 Certification

26.5.3.1 Upon satisfactory results of both the audit of the firm in par. 26.7.2.2 and the demonstration tests in par. 26.7.2.3 above, DBS will issue a Certificate of Approval as well as a notice to the effect that the thickness measurement operation system of the firm has been certified by DBS.

26.5.3.2 Renewal/endorsement of the Certificate is to be made at intervals not exceeding 3 years by verification that original conditions are maintained.

26.5.4 Information of any alteration to the Certified Thickness Measurement Operation System

In case where any alteration to the certified thickness measurement operation system of the firm is made, such an alteration is to be immediately informed to DBS. Re-audit is made where deemed necessary by DBS.

26.5.5 Cancellation of Approval

Approval may be cancelled in the following cases:

a. Where the measurements were improperly carried out or the results were improperly reported.
b. Where the DBS's surveyor found any deficiencies in the approved thickness measurement operation systems of the firm.
c. Where the firm failed to inform of any alteration in 26.7.4 above to DBS.

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