

PART I CLASS MANAGEMENT

TITLE 02 CLASS - MAINTENANCE

SECTION 2 SCOPE OF SURVEYS

CHAPTERS

- A APPLICATION AND CONDITIONS FOR SURVEY
- B HULL AND MACHINERY GENERAL REQUIREMENTS FOR ANNUAL SURVEY
- C ANNUAL, INTERMEDIATE AND RENEWAL SURVEYS
- D. GUIDELINES FOR THE SURVEY OF OFFSHORE MOORING CHAIN CABLE IN USE
- E DRILLING PLANT SURVEYS
- F REQUIREMENTS FOR THE SURVEY OF SELF-ELEVATING UNITS

<p>CONTENT</p> <p>CHAPTER A 6</p> <p>APPLICATION AND CONTITIONS FOR SURVEY 6</p> <p>A1. GENERAL..... 6</p> <p> 100. Application..... 6</p> <p> 200. Definitions..... 6</p> <p>A2. PREPARATION FOR SURVEY 7</p> <p> 100. Conditions for survey..... 7</p> <p> 200. Access to structures 7</p> <p> 300. Equipment for survey..... 8</p> <p> 400. Confined spaces entrance RBNA 9</p> <p> 500. Repairs..... 9</p> <p> 600. Thickness measurements and close-up surveys⁹</p> <p>A3. PROCEDURE FOR IMPOSING AND CLEARING RECOMMENDATIONS / CONDITIONS OF CLASS [IACS PROCEDURE NO.35] 9</p> <p> 100. Purpose 9</p> <p> 200. Definition 9</p> <p> 300. Procedures for imposing, clearing and controlling Recommendations/Conditions of Class 9</p> <p>A4. THICKNESS MEASUREMENTS10</p> <p> 100. Thickness measurements.....10</p> <p>CHAPTER B11</p> <p>HULL AND MACHINERY GENERAL REQUIREMENTS FOR ANNUAL SURVEYS.....11</p> <p>B1. GENERAL SURVEY AND CERTIFICATION SCHEDULE11</p> <p> 100. Modu Code.....11</p> <p> 200. Additional survey of parts/equipment removed for repair and/or overhaul to shore facilities12</p> <p> 300. Class certificate12</p> <p> 400. Statutory Certificate.....12</p> <p>B2. ANNUAL HULL SURVEYS13</p> <p> 100. Hull Annual Survey - VAC.....13</p> <p> 200. All Drilling Units13</p> <p> 300. Surface-Type Units13</p> <p> 400. Self-Elevating Units.....14</p> <p> 500. Column-Stabilized Units.....14</p> <p>B3. ANNUAL MACHINERY SURVEY – ALL UNITS15</p> <p> 100. General.....15</p> <p> 200. Fire protection.....16</p> <p> 300. Non-Self Propelled Units.....18</p> <p>B4. ADDITIONAL REQUIREMENTS FOR ANNUAL MACHINERY SURVEYS OF SELF-PROPELLED UNITS18</p> <p> 100. Additional requirements for self-propelled units18</p> <p>B5. SPECIAL FEATURES – HAZARDOUS AREAS18</p> <p>B6. ADDITIONAL REQUIREMENTS FOR ANNUAL INSPECTON OF SELF-ELEVATING UNITS19</p> <p> 100. Jacking system19</p>	<p> 200. Raw water pumps 19</p> <p>B7. DRILLING SYSTEM ANNUAL SURVEY19</p> <p> 100. Structure & hoisting 19</p> <p> - Break system..... 19</p> <p> 200. Floating Offshore Drilling Rigs (Floaters) specific inspections..... 20</p> <p> Guidance 21</p> <p> 205. Top drive 21</p> <p> Same as itemB8.203. – Heave compensator..... 21</p> <p> 206. Flex joints 21</p> <p> 300. Rotary equipment 21</p> <p> 400. Circulation system..... 22</p> <p> 500. BOP and Pipe handling..... 22</p> <p>B8. WELL CONTROL SYSTEM.....23</p> <p> 100. Control system..... 23</p> <p>CHAPTER C26</p> <p>SURVEY OF THE OUTSIDE OF UNIT’S BOTTOM AND RELATED ITEMS26</p> <p>C1. SURVEY OF THE OUTSIDE OF UNIT’S BOTTOM AND RELATED ITEMS.....26 [IACS: UR-Z-15]26</p> <p> 100. Schedule 26</p> <p> 200. Parts to be Examined 26</p> <p> 300. Ballast Spaces..... 26</p> <p>C2. TAILSHAFT SURVEYS.....27</p> <p> 100. Schedule 27</p> <p> 200. Extension of Intervals of Tailshaft Surveys 27</p> <p>C3. UNDERWATER INSPECTION IN LIEU OF DRYDOCKING SURVEY [URZ 15] 27</p> <p> 100. General..... 27</p> <p> 200. Conditions 27</p> <p> 300. Physical Features 27</p> <p> 400. Hull In-Water Survey - VVCF 27</p> <p> 500. Procedures 28</p> <p> 600. Alternatives..... 28</p> <p> 700. Information Note:..... 28</p> <p>CHAPTER D28</p> <p>HULL AND MACHINERY GENERAL REQUIREMENTS FOR INTERMEDIATE SURVEYS28</p> <p>D1. INTERMEDIATE SURVEYS REQUIREMENTS28</p> <p> 100. Intermediate survey requirements 28</p> <p>CHAPTER E.....30</p> <p>HULL AND MACHINERY GENERAL REQUIREMENTS FOR RENEWAL SURVEYS 30</p> <p>E1. RENEWAL SURVEY - GENERAL.....30</p> <p> 100. Schedule 30</p> <p>E2. RENWEAL HULL SURVEYS – ALL UNITS.....30</p> <p> 100. Special Survey No. 1 30</p> <p> 200. Special Survey No. 2 and Subsequent Special Surveys - Hull, Structure and Equipment 31</p> <p> 300. Lightweight test 31</p>
---	---

E3. RENEWAL MACHINERY SURVEYS – ALL UNITS	31
100. Machinery Class Renewal Survey – from VRM1 on.....	31
E4. ADDITIONAL REQUIREMENTS FOR HULL RENEWAL SURVEYS OF SELF-PROPELLED OR SURFACE UNITS (FLOATERS)	32
100. Self-Propelled Units.....	32
200. Units with Propulsion - Assist or Dynamic Position.....	33
E5. ADDITIONAL REQUIREMENTS FOR HULL RENEWAL SURVEYS OF COLUMN-STABILIZED UNITS.....	36
100. Column-Stabilized Units:	36
200. Lightweight survey.....	37
E6. ADDITIONAL REQUIREMENTS FOR HULL RENEWAL SURVEYS OF SELF ELEVATING UNITS.....	37
100. Self-Elevating Units	38
E7. SPECIAL FEATURES – HAZARDOUS AREAS RENEWAL SURVEY	39
100. Special Features (All Types).....	39
E8. THRUSTER INSTALLATIONS	40
100. Thruster installations	40
E9. BOILER SURVEYS.....	40
100. Schedule	40
E10. DRILLING SYSTEM RENEWAL SURVEY	41
100. General	41
200. Structure & hoisting.....	41
300. Floating Offshore Drilling Rigs (Floaters) specific inspections	41
400. Rotary equipment	42
500. Circulation system.....	42
600. BOP and Pipe handling	42
E11. WELL CONTROL.....	43
200. Emergency disconnect system (EDS).....	44
CHAPTER F	44
GUIDELINES FOR THE SURVEY OF OFFSHORE MOORING CHAIN CABLE IN USE.....	44
F1. SCOPE AND APPLICATION	44
100. Application and Purpose.....	44
200. Survey Interval, Purpose and Extent.....	44
300. Anchor Inspection	45
400. Anchor Swivels.....	45
500. Chain Inspection Criteria	45
600. Fairlead and Windlass Inspection - Chain Systems.....	47
700. Fairleads and Winches Inspection - Wire Rope Systems.....	47
800. Inspection of Jewellery and Miscellaneous Fittings	47
900. Wire Rope Surveys	48

CHAPTER A
APPLICATION AND CONTITIONS FOR SURVEY

CHAPTER CONTENTS

- A1. GENERAL
- A2. PREPARATION FOR SURVEY
- A3. PROCEDURES FOR IMPOSING AND CLEARING RECOMMENDATIONS / CONDITIONS OF CLASS
- A4. THICKNESS MEASUREMENT

References

Wire Rope: API RP 2I and ISO-Standard 4309.

Chain: API RP 2I: "Recommended Practice for In-Service Inspection of Mooring Hardware for Floating Drilling Units".

Surveys

IMO MODU Code

IACS UR Z15

Kingdom Drilling – UK - Drilling Rig Acceptance Standards

A1. GENERAL

100. Application

101. The requirements of this Title MODU have been developed for units intended to engage in offshore drilling operations, and the text reflects that development. They apply to the materials, welding, hull construction, equipment, positioning systems, machinery and electrical installations, fire protection and detection systems, fire extinguishing systems, and load lines of mobile offshore drilling units hereafter designated as “units”. The present Title 02 Section 2 comprises detailed requirements regarding the scope of the surveys for the maintenance of Class of Mobile Offshore Drilling Units.

200. Definitions

201. The definitions presented below are general and taken from IACS UR Z 7. Additional definitions according to the type of unit are given in the relevant Chapters.

202. **Ballast Tank:** A Ballast Tank is a tank that is being used primarily for salt water ballast

203. **Spaces:** Spaces are separate compartments including holds and tanks.

204. **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.

205. **Overall survey:** a survey intended to report on the overall condition of the hull structure and determine the extent of additional Close-up Surveys

206. **Transverse Section:** 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 units, a transverse section includes adjacent frames and their end connections in way of transverse sections.

207. **Representative Space:** Representative Spaces are those which are expected to reflect the conditions of other spaces of similar type and service and with similar corrosion prevention systems. When selecting representative spaces, account is to be taken of the service and repair history on board and identifiable Critical Structural Areas and/or Suspect Areas.

208. **Critical Structural Area:** Critical Structural Areas are locations which have been identified from calculations to require monitoring or from the service history of the subject unit or from similar units or sister units, if applicable, to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the unit.

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

210. **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.

211. **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.

212. **Coating Condition:** Coating condition is defined as follows:

- a. GOOD condition with only minor spot rusting
- b. 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
- c. POOR condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration

213. **Cargo Length Area:** Cargo Length Area is that part of the unit which contains all cargo holds and adjacent areas including fuel tanks, cofferdams, ballast tanks and void spaces.

214. **Prompt and Thorough Repair:** A Prompt and Thorough Repair is a permanent repair completed at the time of survey to the satisfaction of the Surveyor, therein removing the need for the imposition of any associated condition of classification.

215. **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.

216. **‘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.

217. **Air pipe head:** Air pipe heads installed on the exposed decks are those extending above the freeboard deck or superstructure decks.

218 **Automatic air pipe head:** air pipe heads fitted with a device which closes automatically, typically a ball or a disk which when submerged by waves floats and presses against a seat, preventing water ingress.

A2. PREPARATION FOR SURVEY

100. Conditions for survey

101. This Chapter A2 applies to, and the references are as follows:

- a. IACS UR Z15
- b. IMO MODU Rules
- c. NORMAM 01 – Normas da Autoridade Maritima Brasileira – Item 910

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

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

104. 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.

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

106 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.

107. 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.

200. Access to structures

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

202. For all units

- a. For survey, means are to be provided to enable the surveyor to examine the hull and drill structure in a safe and practical way.
- b. One or more of the following means for access, acceptable to the Surveyor, is to be provided:
 - b.1. permanent staging and passages through structures;
 - b.2. temporary staging and passages through structures;
 - b.3. lifts and movable platforms;
 - b.4. other equivalent means.

203. Safe Use of Portable Ladders for Close-up Surveys IACS Rec 78

- a. The Owner shall ensure that equipment selected for temporary work affords adequate protection against the risks of falls from a height.
- b. The manner in which portable ladders can most safely be used by workers shall be specified.
- c. Portable ladders shall rest on a stable, strong, suitably sized, immobile footing so that the rungs remain horizontal. Suspended ladders shall be attached in a manner so that they cannot be displaced and so that swinging is prevented.

- d. The feet of portable ladders shall be prevented from slipping during use by securing the stiles at or near their upper and lower ends, by any anti-slip device or by other arrangements of equivalent effectiveness. Slip resistant feet shall not be used as substitute for the care in placing, lashing or holding a ladder upon slippery surface.
- e. Portable ladders shall meet the following criteria:
- e.1. Not more than 5 m in length for freestanding portable ladders.
- e.2. Non-self-supporting and self-supporting portable ladders shall support at least four times the maximum intended load.
- e.3. The minimum clear distance between side rails for all portable ladders shall be according to a recognized standard.
- e.4. The rungs and steps of portable ladders shall be designed to minimise slipping, e.g. corrugated, knurled, dimpled, coated with skid resistance material.
- f. Ladders shall be maintained free of oil, grease and other slipping hazards.

300. Equipment for survey

301. 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 the RBNA in accordance with the ship Rules, Part I, Title 02, Section 1, Chapter F, F.4 Procedure for Service Suppliers.

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

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

302. Calibration of measuring equipment

- a. Inspection, measuring and test equipment, which Surveyors rely on to make decisions affecting classification or statutory certification, are to be individually identified and calibrated to a recognized national or international standard.
- b. Simple Measuring Equipment: the Surveyor may accept simple measuring equipment (e.g. rulers, measuring tapes, weld gauges, micrometers)

without individual identification or confirmation of calibration, provided they are of standard commercial design, properly maintained and periodically compared with other similar equipment or test pieces.

- c. Shipboard Equipment: the Surveyor may accept equipment fitted on board a unit and used in examination of shipboard equipment (e.g. pressure, temperature or rpm gauges and meters) based either on calibration records or comparison of readings with multiple instruments.
- d. Other Equipment: The Surveyor shall satisfy himself that other equipment (e.g. tensile test machines, ultrasonic thickness measurement equipment, etc) is calibrated to a recognized national or international standard.

303. Safety Meetings

- a. The establishment of proper preparation and the close co-operation between the attending surveyor(s) and the company's representatives on board prior to and during the survey are an essential part in the safe and efficient conduct of the survey.
- b. Applicable safety procedures and responsibilities shall be discussed and agreed to ensure that the survey is carried out under controlled conditions.
- c. Safety Meetings shall be held prior to entering the tank or space and regularly during the survey on board.
- d. Further reference is made to the RBNA "Guideline for Entrance into Confined Spaces" (IACS Recommendation No.72 Confined Space Safe Practice).

304. Communication Arrangements and Equipment for Survey

- a. 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.
- b. 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.

- c. Adequate and safe lighting shall be provided for the safe and efficient conduct of the survey.
- d. Adequate protective clothing shall be made available and used (e.g. safety helmet, gloves, safety shoes, etc) during the survey.

400. Confined spaces entrance RBNA

401. The entrance in confined spaces is to be in accordance with:

- a. Brazilian regulations NR29
- b. RBNA “Guide for Entrance into Confined Spaces”
- c. RBNA checklist for entrance into confined spaces
- d. IACS and IMO recommendations for entrance into confined spaces

500. Repairs

501. 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 unit’s structural, watertight or weather tight integrity, is to be promptly and thoroughly repaired.

502. 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 unit’s fitness for continued service, remedial measures are to be implemented before the unit continues in service.

503. Where the damage found on the structure is isolated and of a localised nature which does not affect the unit’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 Subchapter A3 below with a specific time limit.

600. Thickness measurements and close-up surveys

601. The required thickness measurements, if not carried out by the RBNA itself, are to be witnessed by a surveyor of the RBNA. The surveyor is to be on board to the extent necessary to control the process.

602. The thickness measurement company is to be part of the survey planning meeting to be held prior to commencing the survey.

603. Thickness measurements of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.

A3. PROCEDURE FOR IMPOSING AND CLEARING RECOMMENDATIONS / CONDITIONS OF CLASS [IACS PROCEDURE NO.35]

100. Purpose

101. The purpose of this Procedural Requirement is to set unified procedures for imposing, clearing and controlling Recommendations/Conditions of Class to be followed by RBNA surveyors.

200. Definition

201. “Recommendations” and “Conditions of Class” are to be read throughout this Procedural Requirement as being different terms used by RBNA for the same thing, i.e. requirements to the effect that specific measures, repairs, surveys are to be carried out within a specific time limit in order to retain Classification.

300. Procedures for imposing, clearing and controlling Recommendations/Conditions of Class

301. Recommendations/Conditions of Class shall be imposed for the following:

- a. Repairs and/or renewals related to damages that affect Classification (e.g. grounding, structural damages, machinery damages, wastage over the allowable limits, etc.)
- b. Supplementary survey requirements
- c. Temporary repairs

302. For repairs not completed at the time of survey, a Recommendation/Condition of Class is to be imposed. In order to provide adequate information to the surveyor attending for survey of the repairs, the Recommendation/Condition of 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.

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

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

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

306. 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:

- a. Compartment and location
- b. Structural member
- c. Repair method
- d. Repair extent
- e. NDT/Tests

307. 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.

308. Where RBNA is acting under the Agreement of Delegation signed with the Maritime Authority in Brazil, the maximum periods for conditional and provisory statutory certificates is to be in accordance with NORMAM 06, i.e., 90 days for conditional certificates and 180 days for provisory certificates. After this deadline, the certificates cannot be renewed by RBNA and a final certificate is to be issued or reinstated. Exceptions to this Rule can only be handled by the Maritime Authority.

A4. THICKNESS MEASUREMENTS

100. Thickness measurements

101. Thickness Measurements required in the context of hull structural classification surveys, if not carried out by the RBNA itself shall be witnessed by a surveyor. The attendance of the surveyor shall be recorded. Reference is made to Part I, Title 02, Section 2, Chapter J of the present Rules.

102. This requires the surveyor to be on board, while the gaugings are taken, to the extent necessary to control the process.

103. Prior to commencement of the Intermediate or Renewal Survey a meeting is to be held between the attending surveyor(s), the master of the unit or an appropriately qualified representative appointed by the master or Company, the owner's representative(s) in attendance and the thickness measurement firm's representative(s) so as to ensure the safe and efficient execution of the surveys and thickness measurements to be carried out on board.

104. Communication with the thickness measurement operator(s) and owner's representative(s) is to be agreed during the meeting, with respect to the following:

- a. reporting of thickness measurements on regular basis

- b. prompt notification of the surveyor in case of findings
 - b.1. excessive and/or extensive corrosion or pitting/grooving of any significance
 - b.2. - structural defects like buckling, fractures and deformed structures
 - b.3. - detached and/or holed structure
 - b.4. - corrosion of welds.

105. The thickness measurement survey report is to indicate where and when the meeting took place and who attended (the name of the surveyor(s), the owner's representative(s) and the thickness measurement firm's representative(s)).

106. When thickness measurements are taken in association with Intermediate or Renewal Survey, a documented record indicating where and when the meeting took place and who attended (the name of the surveyor(s), the master of the unit or an appropriately qualified representative appointed by the master or Company, the owner's representative(s) and the representative(s) of the thickness measurement firm(s)) is to be maintained.

107. Monitoring of the thickness measurement process on board

- a. The surveyor is to decide final extent and location of thickness measurements after overall survey of representative spaces on board.
- b. In case the owner prefers to commence the thickness measurements prior to the overall survey then the surveyor is to advise that the planned extent and locations of thickness measurements are subject to confirmation during the overall survey.
- c. Based on findings, the surveyor may require that additional thickness measurements have to be taken.
- d. The surveyor is to direct the gauging operation by selecting locations such that readings taken represent, on average, the condition of the structure for that area.
- e. Thickness measurements taken mainly to evaluate the extent of corrosion, which may affect the hull girder strength, are to be carried out in a systematic manner of all longitudinal structural members that are required to be gauged by the relevant Rule(s).
- f. Where thickness measurements indicate substantial corrosion or wastage in excess of allowable diminution, the surveyor is to direct locations for additional thickness measurements in order to delineate areas of substantial corrosion and to identify structural members for repairs/renewals.

- g. Thickness measurements of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.

108. Review and verification

- a. Upon completion of the thickness measurements, the surveyor is to confirm that no further gaugings are needed, or specify additional gaugings.
- b. If, where special consideration is allowed by the Rule(s), the extent of thickness measurements is reduced, the surveyor's special consideration is to be reported.
- c. In case thickness measurements are partly carried out, the extent of remaining thickness measurements is to be reported for the use of the next surveyor.

CHAPTER B
HULL AND MACHINERY GENERAL
REQUIREMENTS FOR ANNUAL SURVEYS

CHAPTER CONTENTS

- B1. GENERAL SURVEY AND CERTIFICATION SCHEDULE
- B2. ANNUAL HULL SURVEYS
- B3. ANNUAL MACHINERY SURVEYS – ALL UNITS
- B4. ADDITIONAL REQUIREMENTS FOR ANNUAL SURVEYS OF SELF-PROPELLED UNITS
- B5. SPECIAL FEATURES – HAZARDOUS AREAS
- B6. ADDITIONAL REQUIREMENTS FOR ANNUAL INSPECTION OF SELF-ELEVATING UNITS
- B7. DRILLING SYSTEM ANNUAL SURVEY
- B8. WELL CONTROL ANNUAL SURVEY

B1. GENERAL SURVEY AND CERTIFICATION SCHEDULE
[MODU CODE]

100. Modu Code

101. Each unit shall be subject to the surveys specified below:
- a. an *initial survey* before the unit is put in service or before the certificate is issued for the first time;
- b. a *renewal survey* at intervals specified by the RBNA but not exceeding five years except where B1.111.a, B.111.f, B1.111.g is applicable;
- c. an *intermediate survey* within three months before or after the second anniversary date or within three months before or after the third anniversary date of the certificate, which shall take the place of one of the annual surveys specified in B1.101.c;
- d. an *annual survey* within three months before or after each anniversary date of the certificate;
- e. a minimum of two *dry-dock surveys* during any five-year period, except where B1.111.f is applicable. Where B1.111.f is applicable this five-year period may be extended to coincide with the extended period of the validity of the certificate. In all cases the intervals between any two such surveys shall not exceed 36 months;
- f. *survey of the radio station*: the radio station of a unit shall be subject to survey as specified below:

- i. by the RBNA which issues the licence or its authorized representative before the radio station is put into service;
 - ii. when the unit is moved and comes under the administrative control of another coastal State a survey may be carried out by that State or its authorized representative;
 - iii. within three months before or after the anniversary date of the MODU Code certificate, a periodical survey carried out by an officer of the RBNA and/or the coastal State or their respective authorized representative.
 - iv. satellite EPIRBs shall be serviced at intervals not exceeding five years, to be performed by an approved shore-based maintenance facility.
- g. an *additional survey* as the occasion arises.
102. The surveys referred to in B1.101 shall be carried out as follows:
- a. the initial survey shall include a complete inspection of the structure, safety equipment and other equipment, fittings, arrangements and material to ensure that they comply with the provisions of the Rules, are in satisfactory condition and are fit for the service for which the unit is intended;
 - b. the renewal survey shall include an inspection of the structure, safety equipment and other equipment as referred to in B1.102.a to ensure that they comply with the provisions of the Rules, are in satisfactory condition and are fit for the service for which the unit is intended;
 - c. the intermediate survey shall include an inspection of the structure, fittings, arrangements and safety equipment to ensure that they remain satisfactory for the service for which the unit is intended;
 - d. the annual survey shall include a general inspection of the structure, safety equipment and other equipment as referred to B1.102.a, to ensure that they have been maintained in accordance with B2.101.11 and that they remain satisfactory for the service for which the unit is intended;
 - e. the dry-dock survey and the inspection of items surveyed at the same time shall be such as to ensure that they remain satisfactory for the service for which the unit is intended. An RBNA may allow underwater inspections in lieu of a dry-dock survey provided that they are satisfied that such an inspection is equivalent to a dry-dock survey;
 - f. the radio survey shall be sufficient to assure compliance with the relevant provisions for cargo ships of SOLAS chapter IV; and
- g. an additional survey, either general or partial according to the circumstances, shall be made after a repair resulting from investigations prescribed in B1.106.c or wherever any important repairs or renewals are made. The survey shall be such as to ensure that the necessary repairs or renewals have been effectively made, that the material and workmanship of such repairs or renewals are in all respects satisfactory, and that the unit complies in all respects with the provisions of the Rules.
103. The intermediate, annual and dry-dock surveys referred to in B1.102.c, B1.102.d, B1.102.e shall be endorsed on the certificate.
104. As an alternative to the renewal and intermediate surveys provided for in B1.102.b and B1.102.c respectively, the RBNA may, at the owner's request, approve a continuous survey programme provided that the extent and frequency of the surveys are equivalent to renewal and intermediate surveys. A copy of the continuous survey programme, together with the record of the surveys, shall be kept on board the unit and the certificate annotated accordingly.
- 200. Additional survey of parts/equipment removed for repair and/or overhaul to shore facilities:**
201. During anytime of the class period, equipment/parts such as valves, hoses, BOP, etc. may be removed from the unit to be repaired and/or overhauled ashore as part of a maintenance scheme or preventive/corrective action.
202. In such cases, the RBNA surveyor shall be present at the facility where the parts are being repaired and/or overhauled for the relevant inspections and tests.
203. The surveyor will ascertain that the part/equipment and associated tests have been carried out as per applicable International Standards.
204. Upon satisfactory completion, a certificate shall be issued for the part/equipment, as well as the relevant survey reports.
- 300. Class certificate**
301. Upon satisfactory conclusion of the renewal survey, RBNA shall issue a Hull Class Certificate and a Machinery Class Certificate for the unit.
- 400. Statutory Certificate**
401. Where RBNA is acting on behalf of the Brazilian Government or any other Government for which the RBNA has authorization to issue statutory certificates, a certificate called a Mobile Offshore Drilling Unit Safety Certificate (2009) may be issued after an initial or renewal survey to a unit which complies with the provisions of the IMO MODU Code.

302. Any exemptions granted shall be clearly noted on the Certificate.

303. The certificate shall be drawn up in the form corresponding to the model given in the appendix to the Rules. If the language used is neither English nor French, the text shall include a translation into one of these languages.

304. The Mobile Offshore Drilling Unit Safety Certificate (2009) shall be issued for a period which shall not exceed five years.

B2. ANNUAL HULL SURVEYS [IACS UR Z15]

100. Hull Annual Survey - VAC

101. The objective of the hull annual surveys is to ascertain and ensure that the unit is in a satisfactory condition to safely operate without tests or procedures which will intervene with the operation, as the unit is typically in operation during annual surveys.

102. The surveyors are to be satisfied at each Annual Survey that no material alterations have been made to the unit, its structural arrangements, subdivision, superstructure, fittings, and closing appliances upon which the stability calculations or the load line assignment are based.

103. The Owner shall develop a Drilling Equipment Survey and Maintenance Plan which shall be submitted for RBNA approval as follows:

- a. The plan shall describe how each system and equipment is to be inspected at the annual and renewal surveys;
- b. The plan is to clearly identify the requirements for keeping records;
- c. The plan and the associated records shall be kept on board and be available to the RBNA surveyor;
- d. The RBNA surveys shall be carried out according to the plan;
- e. The RBNA surveyor shall check throughout the survey the maintenance records against the Maintenance Plan.

200. All Drilling Units

201. Visual inspection of accessible hatchways, manholes and other openings

202. Visual inspection of machinery casings and covers, companionways, and deck houses protecting openings.

203. Visual inspection of portlights together with deadlights, cargo ports and similar openings in hull sides, ends, or in enclosed superstructures.

204. Visual inspection of ventilators, tank vent pipes together with flame screens, and overboard discharges from enclosed spaces.

205. Visual inspection of watertight bulkheads and end bulkheads of enclosed superstructures.

206. Visual inspection of closing appliances for all the above, including hatch covers, doors check valves, together with their respective securing devices, dogs, sill, coamings and supports.

207. Visual inspection of freeing ports together with bars, shutters and hinges.

208. Visual inspection of windlass and attachment of anchor racks and anchor cables.

209. Visual inspection of protection of the crew, guard rails, lifelines, gangways, and deck houses accommodating crew.

210. Determine that means of escape from working and accommodation spaces leading to muster stations, helideck and embarkation deck are unobstructed and clearly marked.

300. Surface-Type Units

301. Hull inspection

- a. check in general that there has been no deterioration in the strength of the hull
- b. outer shell plating above the waterline, relevant shell doors and accessible parts of the rudders
- c. plating of the freeboard deck and exposed decks, superstructures (in particular attention to end bulkheads), with their openings and means of closure
- d. examination in general and as far as can be seen the hull and its closing appliances
- e. watertight penetrations as far as practicable
- f. positions of the deck line and load line which, if necessary, are to be re-marked and re-painted
- g. check that no alterations have been made to the hull or superstructures that would affect the calculations determining the position of the load lines
- h. watertight integrity of the closures to any openings in the ship's side below the freeboard deck

- i. examination the special requirements for ships permitted to sail with type “A” or type “B-minus” freeboards (see LLC 66/88/03 regulations 42 through 45)
 - j. superstructure end bulkheads and the openings therein
 - k. ventilators and air pipes, including their coamings and closing appliances
 - l. watertight integrity of the closures to any openings in the ship’s side below the freeboard deck
 - m. scuppers, inlets and discharges
 - n. garbage chutes
 - o. examination of the side scuttles and deadlights
 - p. bulwarks including the provision of freeing ports, renewal attention being given to any freeing ports fitted with shutters
 - q. guardrails, gangways, walkways and other means provided for the protection of the crew and means for safe passage of crew
 - r. collision and the other watertight bulkheads as far as can be seen
 - s. examination and testing (locally and remotely) of all the watertight doors in watertight bulkheads
 - t. drainage from enclosed cargo spaces situated on the freeboard deck is satisfactory
 - u. functionality of bilge well alarms to all cargo holds and conveyor tunnels
 - v. bilge pumping system for each watertight compartment
 - w. confirmation, 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
 - x. ship’s identification number permanently marked
 - y. confirmation of that new equipment containing asbestos was not fitted on board since last survey
 - z. temporary anchoring and mooring equipment as far as can be seen. For ships built after 01/01/2007, confirmation of that the towing and mooring equipment is properly marked with any restriction associated with its safe operation
- aa. steering gear:
 - i. examination of and testing the operation of main and auxiliary steering arrangements, including their associated equipment and control systems
 - ii. confirmation of 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
 - iii. confirmation of 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
 - iv. confirmation of 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
- 400. Self-Elevating Units**
- 401. Visual inspection of the plating in way of the splash area for deformation, cracks and corrosion.
 - 402. Visual inspection of jack-house structures and attachments to upper hull or platform.
 - 403. Visual inspection of jacking or other elevating systems and leg guides, externally. Legs as accessible above the waterline,
 - 404. Visual inspection of plating and supporting structure in way of leg wells.
- 500. Column-Stabilized Units**
- 501. Visual inspection of columns, diagonal and horizontal braces together with any other parts of the upper hull supporting structure as accessible and/or above the waterline:
 - a. Horizontal and vertical (diagonal) bracings
 - b. Column and pontoon shell
 - c. Interconnection between pontoons
 - d. Bulkheads
 - 502. Visual inspection for means of leakage detection.
 - 503. Note: At the 1st Annual Survey after construction, Column Stabilized and Self Elevating Units may be subject to examination of major structural components including non-destructive testing, as deemed necessary by the RBNA. If the RBNA deems such survey to be necessary, the extent shall be agreed to by the RBNA and

the Owner or operator prior to commencement of the Survey.

B3. ANNUAL MACHINERY SURVEY – ALL UNITS

100. General

101. Annual Machinery Surveys are to be held at the same time as an Annual survey. 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. Where deemed necessary by the Surveyor, further and/or more detailed inspections may be required. [IACS UR Z15]

102. Review of all maintenance records for the machinery on board.

103. Examination of the ventilation systems for the spaces below the freeboard deck and closed superstructures to confirm that all means of closure and manual and automatic stops are in working condition;

104. Confirmation of 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

105. Boiler inspection: Periodic Security inspection, consisting of internal and external examination shall be carried out inside the following time limits:

- a. twelve months for boilers in categories "A", "B" and "C".
- b. 12 months for alkali recovery boiler of any category.
- c. twenty-four months for boilers of category "A", provided that every twelve months the opening pressures of safety valves are tested.

108. Examination of heat exchanger systems which are part of the essential services to confirm the general operational and maintenance condition. Special consideration is to given to all the safety devices. [NR 13]

109. A general examination of electrical machinery, the emergency sources of electrical power, the switchgear, and other electrical equipment, including operation of same. [IACS UR Z15]

110. Electro mechanical equipment

- a. Run Equipment as necessary to apply test load
- b. Check all safety devices (shutdowns and alarms) and no load

- c. Measure temperature rise of generators

111. Load Sharing Test

- a. Run all engine combinations at half load to check: function of automatic synchronization active power sharing
- b. Adjust load sharing equipment to correct any faults present

112. Motor Control Centres

- a. Visual inspection
- b. Check cleanliness of each starter/isolator cubicle, busbars, insulators, etc
- c. Electrical inspection

113. Silicon controlled rectifiers (SCR) Test

- a. Platform visual inspection
- b. Check cleanliness of the complete system: busbars, SCR's electronics, etc
- c. Electrical inspection
 - i. Check internal SCR protections: electronic overcurrent, loss of field, etc
 - ii. Check external protection and SCR alarms/shutdowns: i.e. ventilation on DC motors, mud pump lub oil, etc
 - iii. Check the level of current limit on draw-works, mud pumps and rotary table

114. Main and Emergency Switchboards

- a. Make visual inspection
- b. Check cleanliness of switchboard cubicles, busbars, insulators and all equipment in cubicles
- c. Make electrical inspection

Guidance

IR = Insulation Resistance

End of guidance

- i. Check and record IR values of busbars
 - ii. Check breakers, function tests in test position
 - iii. Check setting of all breakers with last survey report
 - iv. Check and record IR values of all outgoing circuits
- d. Distribution Boards

- i. Visual inspection
 - ii. Check cleanliness of each distribution board
 - iii. Electrical inspection
 - iv. Check and record IR values of each circuit
115. Confirmation that, 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 start.
- a. Emergency Generator**
- i. Running test
 - ii. Check starting sequence with a simulated black out
 - iii. Check alarms and shut down
116. Examination, in general, of the precautions provided against shock, fire and other hazards of electrical origin are being maintained.
117. A general examination of the automatic and remote-control system is to be made to the Surveyor's satisfaction. The machinery-space fire-detection and bilge water-level alarms are to be tested to confirm satisfactory operation [IACS UR Z15]
118. Examination of all piping, pumps and accessories of the essential services to confirm the general operational and maintenance condition. Operational tests may be required if deemed necessary.
- a. Fuel Oil System**
- i. Running test on all pumps recording amperes and pressures
 - ii. Function test all quick closing valves
- b. Seawater Cooling System**
- i. Perform running test on all pumps recording amperes and pressures
- c. Drill Water System**
- ii. Perform running test on all pumps recording amperes and pressures
- d. Potable Water System**
- i. Perform running tests on all pumps recording amperes and pressures
 - ii. Function test hydrophor system
 - iii. Check proper operations of calorifier elements
119. Fire pumps and emergency fire pumps. Operational tests may be required if deemed necessary.
120. Examination of each bilge pump and Confirmation of that the bilge pumping system for each watertight compartment is satisfactory
121. Examination of air vents heads and piping, sounding pipes to confirm the general operational and maintenance condition:
- a. Examination of the weld connection between air pipes and deck plating.
 - b. External examination of all air pipe heads installed on the exposed decks.
 - c. Examination of flame screens on vents to all bunker tanks.
 - d. Examination of ventilators, including closing devices, if any.
 - e. Examination of the anti-flame grids, if any.
122. Examination of scuppers, sounding pipes to confirm general operational and maintenance condition. Where fitted, to confirm means of drainage and means of closure.
123. Visual examination of the condition of any expansion joints in seawater systems and their connections.
124. Test of quick closing valves on tanks for fuel, lubrication oil and other flammable oils.
125. Confirmation that the surface temperature in any point of each one of the machinery spaces is not exceeding 200°C.
- 200. Fire protection [UR Z15]**
201. 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 ventilations systems from outside the space served
202. Confirming that the means of escape from accommodation, machinery and other spaces are satisfactory
203. Confirming that the means of escape from accommodation, machinery and other spaces are satisfactory
204. Examination of 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.

205. Verification of the provision and randomly Examination of the condition of the portable and non portable fire extinguishers.

206. Confirmation that the fire fighters' outfits and emergency escape breathing devices – EEBDs – are complete and in good condition and that the cylinders, including the spare cylinders, of any required self-contained breathing apparatus are suitably charged.

207. Verification of the operational readiness and maintenance of fire-fighting systems.

208. Examination of the fixed fire-fighting system for the machinery, cargo, vehicle, special category and ro-ro spaces, as appropriate, and Confirmation of that its means of operation is clearly marked.

209. Fixed gas fire-extinguishing system

- a. bottles of CO₂ (or other gas) fixed fire-extinguishing systems and their accessories, including the insulation for insulated low pressure CO₂ containers
- b. system controls, piping, instructions and marking: proper maintenance and servicing, including date of last system tests which must be engraved on the bottles
- c. release alarm triggered before the CO₂ is released

210. Sprinkler system

- a. system, including piping, valves, sprinklers and header tank
- b. test of the automatic starting of the pump activated by a pressure drop alarm system while the above test is carried out

211. Water-spraying system

- a. system, including piping, nozzles, distribution valves and header tank
- b. starting of the pump activated by a pressure drop (applicable only for machinery spaces)

212. fixed foam systems (low or high expansion)

- a. examination of the foam system
- b. the minimum number of jets of water at the required pressure in the fire main is obtained when the system is in operation
- c. checking the supplies of foam concentrate and receiving confirmation that it is periodically tested

(not later than three years after manufacture and annually thereafter) by the manufacturer or an agent

213. dry powder system

- a. dry powder system, including the powder release control devices
- b. check the supplies of powder contained in the receivers and that it has maintained its original smoothness
- c. check that the pressure of propelling inert gas contained in the relevant bottles is satisfactory.

214. Examination of the fire-extinguishing and special arrangements in the machinery spaces and confirmation of, 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.

215. Examination of, as far as possible, and testing, as feasible, any fire detection and alarm system.

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

217. Examination of the helicopter facilities.

- a. drainage arrangements around the landing area
- b. fire fighting appliances and arrangements
- c. refuelling systems and hangar facilities for cleanliness and absence of leaks, condition of gutters and drainage arrangement.

218. Examination of the arrangements for remote closing of valves for oil fuel, lubricating oil and other flammable oils and Confirmation of, 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.

219. Examination of and testing of the general emergency alarm system.

220. Confirmation, as far as practicable, that no changes have been made in the structural fire protection, examination of 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.

221. Confirmation that the means of escape from accommodation, machinery and other spaces are satisfactory.

222. The general emergency alarm system is to be examined and tested.

300. Non-Self Propelled Units

301. A general examination of items required for classification such as auxiliary machinery, pumps, piping, electrical installation in hazardous areas and fire extinguishing apparatuses to be carried out. See B3.100 and B3.200 above. [IACS UR Z15]

B4. ADDITIONAL REQUIREMENTS FOR ANNUAL MACHINERY SURVEYS OF SELF-PROPELLED UNITS

100. Additional requirements for self-propelled units

101. A general examination of main and auxiliary engines, boilers, steering machinery, pumps, piping, electrical installation including those in hazardous areas, and fire extinguishing apparatus. [IACS UR Z15]

102. Examination of all Main Engine parts, Auxiliary Engine parts, reduction gears and couplings including bases. Operational and performance tests will be required when deemed necessary.

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

- a. Function test cooling and lubricating systems, record pressures/amperes on pumps
- b. Check and record IR values, fans, motors and chokes
- c. Function test controls from pilot house and control room
- d. Function test propulsion ahead and astern at maximum achievable r.p.m. dependent on moorings and tide for minimum of two hours in each direction. Re-lubricate bearings while running
- e. Draw oil sample from stern tube and send for analysis

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

105. Examination of 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.

106. Confirmation 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.

107. Confirmation of that the engineer's alarm is clearly audible in the engineers' accommodation.

108. When the Annual Machinery Survey coincides with a Propeller Shaft Survey or with an In Water Survey the following additional item are to be measured and operationally tested, as relevant:

- a. clearance of the thrust bearing of main and auxiliary turbines of the propulsion system;
- b. crankshaft deflexion and axial clearance of the thrust bearing of the Main Engine of the propulsion system;
- c. crankshaft deflexion and axial clearance of the thrust bearing of the Auxiliary Engines; and
- d. isolation of each generator, motor, driver, connection switches, switchboards, electric cables

109. Steering Gear

- a. Function test main and emergency steering systems, record amperes/ pressures, etc

B5. SPECIAL FEATURES – HAZARDOUS AREAS

100. Special Features [IACS UR Z15]

101. A general examination of hazardous areas, remote shutdown arrangements, fire-fighting apparatus where included in the RBNA Rules, self-elevating systems, piping systems, and bilge systems is to be made.

102. Enclosed hazardous areas such as those containing open active mud tanks, shale shakers, de-gassers and desanders are to be examined and doors and closures in boundary bulkheads verified as effective.

103. Ventilating systems including ductwork, fans, intake, exhaust locations for enclosed restricted areas and alarm system are to be examined, tested and proven satisfactory.

104. The following equipment shall be surveyed and tested in hazardous areas:

- a. Operational test of ventilation system

- b. Inspection and test of self-closing gas-tight doors and airlocks including other openings or accesses
- c. Alarms or shut down of pressurized equipment
- d. Electrical equipment:
 - a. Check:
 - i. the required degree of protection.
 - ii. Earthing
 - b. Test:
 - i. Function test of pressurized equipment and alarms
 - ii. Insulation resistance of power circuits
- e. Devices for monitoring insulation resistant and/or earth leaks
- f. Protection devices for combustion engines

B6. ADDITIONAL REQUIREMENTS FOR ANNUAL INSPECTON OF SELF-ELEVATING UNITS

100. Jacking system

- 101. The brake torques of jacking machinery on self-elevating units shall be checked. Where provided, the fixation rack system shall also be checked.
- 102. Spot check on oil sample records.
- 103. A visual examination of the hydraulic lifting system is to be carried out, where applicable. [IACS Z15 3.]

200. Raw water pumps

- 201. Check availability of water supply for safety systems, i.e fire water for different operational conditions (transit, during jacking and in elevated conditions).

B7. DRILLING SYSTEM ANNUAL SURVEY

100. Structure & hoisting

- 101. The following systems are here considered as part of the structure & hoisting:
 - a. Structure
 - Derrick
 - Drill floor
 - Substructure
 - Support structure
 - b. Hoisting
 - Crown block
 - Draw-works
 - Elevators

- Travelling block
- Gooseneck & swivel
- Blocks and sheaves
- Drill line (drill cable)
- Break system

102. **Structure for the drilling system:** The annual survey of the structure for the drilling system consists of:

- a. Visual inspection of the primary structure of the derrick, foundations, anchorages, checking for corrosion, deformation and cracks. Inspect for bent or twisted girths and braces
- b. Visual inspection of the welding
- c. Visual inspection of the bolts and their secondary securing arrangement (hammering test is acceptable)
- d. Check for loose items which may fall down
- e. Visual inspection of the substructure and deck reinforcements
- f. Visual inspection of the drill floor with emphasis on structural integrity and supporting structure for equipment applied in drilling operations
- g. Check the records of the routine check of the torqueing of structural bolts

103. **Hoisting system:** The annual survey of the hoisting system consists of:

- a. Check of the records of maintenance
- b. Check the records of routine NDT inspections
- c. Visual survey of the system
- d. Check block guide rails
- h. Run the draw-works with no load to check proper function of:
 - i. The lubricating system
 - ii. The brakes
 - iii. The catheads
 - iv. Air and water supplies
 - v. The mechanical controls
 - vi. The eletro-magnetic (/Elmagco) clutches
 - vii. Clutch, checking teeth wear
 - viii. Check brake rim for wear, corrosion and grooving
 - ix. Check brake blocks for wear

- x. Run both the main drum and the sand line reel on all motors transmission and clutch combinations

Guidance

Definition of SPONSON (Webster on-line dictionary)

a : a projection (as a gun platform) from the side of a ship or a tank

b : an air chamber along a watercraft (as a canoe) to increase stability and buoyancy

2: a light air-filled structure or a winglike part protruding from the hull of a seaplane to steady it on water

End of guidance

- xi. Test the foot throttle
- xii. Test the electromagnetic brake (Elmagco brake)
- xiii. Test the crown-o-matic

Guidance

The Automatic Crown Safety Device (Crown-O-Matic)is a safety aid installed on a drawworks drum to control the distance a traveling block may be pulled into the derrick this eliminating the possibility of pulling the traveling block into the crown.

End of guidance

- xiv. Inspect drilling line for condition and note spare length
- xv. Check ton mile programme for block line

104. **Crown Block, Travelling Blocks, Hooks**

- a. Visually check for wear, damage and misalignment
- b. Check all grease fittings to verify proper lubrication
- c. Run block up and down while visually observing sheaves and dollies. Listen for excessive bearing wear noises
- d. Unlock, turn hook and relock in all possible positions
- e. Check condition and safety equipment on all suspended sheaves
- f. Check block trolley

200. **Floating Offshore Drilling Rigs (Floaters) specific inspections**

201. The following systems are here considered as part of the specific requirements for floaters:

- Moonpool
- Heave compensator
- Marine riser tensioning system
- Flex joints
- Top drive

202. **Moonpool**

- a. Visual inspection of the hull and deck structure around the drilling well (moon-pool) and in vicinity of any other structural changes in section, slots, steps, or openings in the deck or hull and the back-up structure in way of structural members or sponsons (*) connecting to the hull.

203. **Heave compensation**

- a. Visual inspection
- b. Check of records of regular testing of the Pressure Safety Valves (PSV) valves in the system
- c. Check records of maintenance (wires, sheaves, etc.)
- d. Check records of calibration of accumulator pistons

203. **Riser Tensioners**

- a. Visual inspection
- b. Review records of regular testing of:
- i. Air compressors
 - ii. Accumulator bottles
 - iii. Pressure vessels
 - iv. Control panels
- c. Ensure all compressors are functional and working correctly
- d. Check that a riser tensioner programme is in place and a proper slip and cut procedure is being followed. Make sure tonne mile records are properly kept
- e. Verify that all APV pressure vessels are in good order and that safety valves have been recently inspected and calibrated
- f. Inspect control panels for overall condition and that all gauges are working. Hydraulic fluid levels in tensioners must be checked and seen to be part of a planned maintenance procedure
- g. Hydraulic fluid samples shall be sent ashore for testing
- h. Inspect all rod seals for signs of excessive leakage
- i. Inspect all sheaves for wear and make sure proper greasing has been carried (no missing grease lines)
- j. Inspect and record condition of piston rods

204. Drill string Compensator (DSC)

Guidance

The objective is to determine that the DSC has the capacity for the work envisaged. There are also several safety hazards associated with a DSC. It is therefore imperative that all components are in good order and secure.

End of guidance

- a. Inspect all hoses for damage and leaks
- b. Check chain tensions and chains for stretch, cracked links and wear
- c. Ensure all covers and guards are in place and correctly bolted
- d. Function lock bar for free movement
- e. Inspect hydraulic piston rods for damage and record condition
- f. Ensure there is no excessive leakage from rod seals
- g. Run block up and down to ensure dolly rollers and tracks e in good shape
- h. Ensure safety valves are in place and hydraulic fluid levels are correct
- i. Driller's control panel:
- j. Pressure up and check for leaks
- k. Ensure all pressure gauges are working properly
- l. Ensure position indicator lights are working and lock bar lights change correctly
- m. Ensure all APV's are in good condition and the safety valves fitted have been tested and calibrated recently

Guidance

PSV's are to be opened for inspection and retested at 30 month intervals.

End of guidance

205. Top drive

Same as item B8.203. – Heave compensator

206. Flex joints

- a. Visual inspection
- b. Check the records of maintenance

207. Marine riser

- a. Carry out inspection on all pin and boxes. This must include pins and boxes on the slip joint, the pin of the diverter, all riser handling subs and the riser adaptor flange of the LMRP
- b. Ensure all kill and choke lines are straight and all retaining clamps are correctly fitted. Check there is no excessive corrosion on these lines.
- c. Dog mechanisms shall be in good order. If any doubt exists, they shall be fully stripped out and inspected
- d. Inspect all kill and choke stabs and boxes for wear or wash marks. New packing shall be fitted
- e. Inspect all riser joint packing and replace any that appear squashed
- f. The inner barrel of the slip joint shall be inspected for wear, damage or key seating, any wear shall be recorded
- g. From records, find length of service of slip joint packer
- h. Inspect condition of riser slew ring (gimbal), ensure it is free
- i. Inspect riser gooseneck boxes for damage and wash marks. Inspect for wear or washing of gooseneck stabs

300. Rotary equipment

301. The rotary system is comprised of:

- Swivel
- Kelly
- Turntable or rotary table

302. The annual survey of the rotating equipment consists of:

- Check of the records of maintenance
- Check the records of routine NDT inspections (for some models, recommended every 6 months)
- Visual survey of the system

303. Top drive / Rotary Table

- a. Test with no load at various speeds
- b. Check amperes, volts for the two mechanical gears
- c. Operate the locking system (right and left)
- d. Check and record drive gear backlash

304. Rotary Swivel

- a. Check operation
- b. Check wash pipe integrity

400. Circulation system

401. The circulation system is comprised of:

- Return line
- Shale shaker
- De-sander
- De-silter
- Degasser
- Mud tanks
- Suction line
- Mud pump and motor
- Discharge line
- Stand pipe
- Rotary or vibrating hose

402. The annual survey of the rotating equipment consists of:

- General visual survey
- Check the records of maintenance
- For mud pumps, visual survey and check records of maintenance (fluid ends and safety pop-off valves)
- For mud pits check records of regular testing of overboard dump valves in the mud pits
- Check records of maintenance for the valve in the drill string
- Check for leaks in the suction and discharge lines
- Check the visual conditions of pipes and hoses and their end connections
- Check visually the general condition of shale shaker, desander, desilter and degaser.

403. High pressure (HP) Mud Pumps

- a. Check proper function of lubricating system of cabin cases and liner rods
- b. Gradually vary rpm by steps. Run for 10 minutes at each step
- c. Load test by pumping through the choke
- d. Run separately each pump with choke open
- e. Test safety devices:

- i. Chain lubricating failure
- ii. Rod lubricating failure
- iii. Emergency stop

h. A parallel test of all pumps

404. Low pressure (LP) Mud System

- a. Check that mud pits are clean and free from any loose material
- b. Check equalising valves integrity
- c. Check dumping valves integrity
- d. Check drill water and oil filling valves at each pit
- e. Check all related piping, valve by valve, at maximum system pressure attainable. Test all the mud guns
- f. LP mud pumps: check the proper function of the various LP mud pumps. Run test of agitators.
- g. Fill tanks and traps with sea water and check valves and gate integrity
- h. Run the pumps and test the circuits at maximum attainable pressure and with each valve combination
- i. Run test of the shale shaker
- j. Run test of the mud cleaners, de-sanders, de-silters and centrifuge
- k. Check the size, location, instrumentation and ergonomics of the trip tank

405. HP Mud System pressure tests

- a. The HP mud piping shall be tested to full working pressure valve by valve
- b. The valves of the stand pipe manifold are to be tested to full working pressure
- c. For each test, the pressure shall be held for 5 minutes and recorded

406. Choke Manifold, Function/Pressure Test

- a. Individually function test automatic choke and all manual chokes
- b. Pressure test choke manifold

500. BOP and Pipe handling

501. The annual survey of the BOP and pipe handling equipment consists of:

- Visual inspection of cranes, winches and supporting structure
- Visual inspection of vertical and horizontal pipe handling
- BOP and riser overhead or gantry crane visual inspection
- Visual inspection of X-mas tree trolley

The BOP rating and certification must comply with that set down in the Drilling Policy Document as a minimum standard. To save time arrange that a test is taking place on the BOP to full working pressure as you arrive on the rig. If this is satisfactory, have the contractor perform the low-pressure test then follow the inspection procedure outlined below. The following inspections will provide an overall picture of the condition of the BOP and a summation of the conclusions enable a judgement to be made as to whether or not the equipment is suitable for the task envisaged. Since this is an equipment inspection, naturally a full pressure at both low and high pressure will be carried out to the full rated pressure of the equipment. The elastomers used in the BOP must be checked to have a temperature rating in excess of the anticipated bottom hole temperature.

B8. WELL CONTROL SYSTEM

100. Control system

101. The well control system is comprised of:

End of guidance

- a. Blowout prevention
 - Blowout preventer (BOP)
 - Subsea BOP
 - Choke & kill system
 - 2Variable bore ram
 - Blind shear ram
 - Casing shear ram
 - Annular preventers
 - LMRP - lower marine raiser package
 - Choke manifold
 - Control system
 - Connector
 - Diverter
- b. Secondary well control
 - Acoustic
 - ROV Interface
- c. Emergency well control
 - Emergency disconnect system (EDS)
 - Deadman
 - Auto disconnect system (ADS)
 - Auto disconnect function (ADF)
 - Autoshear

105. Ram Type BOP's

- a. Request that the contractor opens up one frame at your discretion then:
- b. Inspect ram bores and cavities for overall condition
- c. Check all bonnet faces and racetracks for marks, pitting and evidence of washmarks
- d. Inspect condition of ram operating piston rods for marks or gouges
- e. Check length of service from maintenance records
- f. Record any wear to bore, etc
- g. Agree percentage wear with contractor to any rubber goods to be re-used (e.g., variable packers 15% worn)
- h. Ensure equipment is available and working for correct torquing of bonnet bolts wedge locks
- i. Pressure test hydraulic function of rams

102. The annual survey of the well control system consists of:

106. Annular/spherical BOP's

- a. Visual inspection as far as possible
- b. Confirm gauge calibration of the control instruments
- c. Check records of function test of the EDS, Deadman and Autoshear
- d. Check records that the valve sequence interlocks of the choke & kill system are function tested

- a. Inspect and agree with drilling contractor on percent wear to elements
- b. Record any internal wear
- c. Pressure test hydraulic function
- d. Inspect maintenance record as to length of service since last dismantling and rebuilding

103. Choke Manifold, Function/Pressure Test

107. BOP Control Pods

- a. Individually function test automatic choke and all manual chokes

- a. Inspect pipe work of pods, ensure no hard pipe has been replaced by flexible hose
- b. Have pod release mechanisms demonstrated

104. Blow out preventers

Guidance

- c. Pressure all SPM or slide valves to prove they seal correctly and don't leak
 - d. Function manifold and annular regulators throughout their range of pressures to check operation and freedom from leaks
 - e. Ensure recovery arms are fitted and alignment is correct
 - f. Inspect general condition of seal areas and seals
 - g. Estimate general overall condition of pods, also find out their length of service
 - h. Determine if there is a spare pod available on board
- 108. Control Umbilicals and Reels**
- a. Make an inspection of all umbilical terminations and ensure pod umbilical support shrouds are fitted at pods
 - b. Pressure umbilicals and look for leaks
 - c. Inspect RBQ receiver plates
 - d. Ensure mini panel and regulators on both reels are fully functional and in good order
 - e. Run air motors on reels and check braking
 - f. Ensure there is an adequate supply of hose clamps for the water depth envisaged
 - g. Check hose lengths
- 109. Pod Receptacles**
- a. Check pod receptacles for washing and overall condition
 - b. With BOP assembled check alignment of the pod and pod receptacles
- 110. Surface Closing Unit**
- a. Check surface accumulator pre-charge
 - b. Run both electrical and air high pressure charging pumps. Ensure correct cut out pressures are met
 - c. Ensure all safety valves are in place
 - d. Test run mixing system
 - e. Ensure all gauges are functional
 - f. Stock check for adequate supply of soluble oil and glycol
 - g. Ensure all bolts are fitted to flame proof enclosures
- h. Check whether there is emergency nitrogen system fitted
 - i. Check that the pilot system has dedicated accumulators
 - j. Ensure planned maintenance has been carried out, filters, traps, oil changes, etc
 - k. Test function control valves from satellite panels
 - l. Test low level and low pressure alarms
 - m. Have samples of control fluid sent ashore for testing
 - n. Inspect all gauges, read backs and flow meters for correct reading
 - o. Check accumulator volume as a function of opening and closing functions
- 111. Slave Panels (Drillers, Tool pusher's Mini-panel)**
- a. Ensure all gauges give accurate read back from closing unit
 - b. All lamps shall light and change correctly (done in conjunction with master panel function test)
 - c. Function flow meter
 - d. Ensure all flame proof covers at rear of panel are in place and correctly bolted. Also make sure panel is protected from elements
 - e. Test low pressure and low level alarms
- 112. BOP Hoses, Pipe work and Accumulators**
- a. Make visual inspection of all hoses for damage and bad fittings
 - b. Pressure test all hoses, pipe work and shuttle valves
 - c. Check pre-charge of stack accumulators and function stack accumulator dump
- 113. Control Systems Secondary Support**
- a. Check whether there is a ROV intervention fitted. If intervention is fitted, list functions it perform
 - b. Check whether there is an acoustic BOP system fitted. If acoustic system is available, list functions
- 114. Kill and Choke Fail-safe Valves**
- a. Determine length of service from maintenance records
 - b. Inspect previous pressure test as to proof of good service

- c. From above two checks, make decision as to whether valves shall be dismantled to inspect gates and seats
- d. Pressure test hydraulic and fail-safe function
- e. If balance chambers fitted, check oil levels
- 115. Wellhead and LMRP Connectors**
- a. Check length of use in service from maintenance records
- b. Pressure up and test hydraulic functions for leaks
- c. Inspect gasket profile for wear and marks
- d. Inspect dogs for wear and damage
- e. Function connector to see smooth and proper operation
- f. Check open and close TV indicators are in place
- g. Record any key seating and internal wear measurements
- 116. Kill and Choke Lines**
- a. Check for wear and washing
- b. Assess lines for usage, i.e. how many wells have been killed through these lines? Are they likely to be washed?
- c. Remove any buffer flanges and inspect
- d. If any doubts as to condition remains, have wall thickness checked ultrasonically
- 117. Kill and Choke Stabs and Receptacles**
- a. Inspect for overall condition and absence of wash marks
- 118. Kill and Choke Transition Hoses**
- a. Determine length of service from records
- b. If service is long or several wells, have been killed, have hoses removed and inspected internally
- 119. Ball Joint or Flex Joint**
- a. Inspect internally for wear and record same
- b. If a ball joint is used, determine from maintenance records service life since new seals were fitted
- 120. Riser Adapter Flange**
- a. Determine when last NDT inspection was carried out
- b. Have dog mechanism removed and all components inspected as to condition
- c. Carry out internal inspection for wear and record same
- 121. BOP Frame**
- a. Check all post tops are working properly
- b. Check all guideline gates and nuts/bolts are in place and working correctly
- c. Check all frame work for alignment
- 122. Diverter System**
- a. Inspect the through bore of the diverter and ball joint for wear and record same
- b. Inspect the diverter packer and condition and wear, record same
- c. Ensure all diverter seals and locking dogs are in good order and function all dogs
- d. Check that all cap screws are in place on diverter and have their torque checked
- e. Verify the condition of the handling tool. Ensure that inspection of the tool is recent
- f. If of the threaded type, dismantle and inspect threads for wear
- g. Operate all valves in the diverter system to prove their operation and sequencing from both panels
- h. Inspect and function test the diverter control system master panel
- i. Fully function test the driller's diverter panel and ensure all pressure gauges give the same readings as the main panel

CHAPTER C
SURVEY OF THE OUTSIDE OF UNIT'S BOTTOM
AND RELATED ITEMS

CHAPTER CONTENTS

C1	SURVEY OF THE OUTSIDE OF UNIT'S BOTTOM AND RELATED ITEMS
C2.	TAILSHAFT SURVEYS
C3.	UNDERWATER INSPECTION <i>IN LIEU OF</i> DRYDOCKING SURVEY

**C1. SURVEY OF THE OUTSIDE OF UNIT'S
BOTTOM AND RELATED ITEMS**
[IACS: UR-Z-15]

100. Schedule

101. The outside of the unit's bottom and related items are to be examined two times in any five (5) year period, with an interval not exceeding three (3) years between examinations. For units operating in salt water for less than six (6) months each year, the survey interval may be increased by the RBNA.

102. Consideration may be given at the discretion of the RBNA, to any special circumstances justifying an extension of the interval.

103. Proposals for alternative means of examining the unit's bottom and related items while afloat may be considered, provided they are in general agreement with C.5 below.

200. Parts to be Examined

201. Surface-type Units (unit or barge type units)

- a. External surfaces of the hull, keel, stem, stern frame, rudder, nozzles, and sea strainers are to be selectively cleaned to the satisfaction of the attending Surveyor and examined together with appendages, the propeller, exposed parts of stern bearing assembly, rudder pintle and gudgeon securing arrangements, sea chest and strainers, and their fastenings.
- b. Propeller shaft bearing, rudder bearing, and steering nozzle clearances are to be ascertained and reported upon.

202. Self-Elevating Units

- a. External surfaces of the upper hull or platform, spud cans, mat, underwater areas of legs, together with their connections as applicable, are to be selectively cleaned to the satisfaction of the attending Surveyor and examined.

- b. At each Drydocking Survey or equivalent, after Special Survey No. 2, the Surveyor is to be satisfied with the condition of the internal structure of the mat or spud cans. Leg connections to mat and spud cans are to be examined at each Drydock Survey or equivalent. Non-destructive testing may be required of areas considered to be critical by the RBNA or found to be suspect by the Surveyor.

203. Column-Stabilized Units

External surfaces of the upper hull or platform, footings, pontoons or lower hulls, underwater areas of columns, bracing and their connections, sea chests, and propulsion units as applicable, are to be selectively cleaned and examined to the satisfaction of the attending Surveyor. Non-destructive testing may be required of areas considered to be critical by the RBNA or found to be suspect by the Surveyor.

204. Ballast Spaces

In conjunction with Drydocking Surveys (or equivalent) after Special Survey No. 1 and between subsequent Special Surveys, the following ballast spaces are to be internally examined, thickness gauged, placed in satisfactory condition as found necessary, and reported upon. If such examination reveals no visible structural defects, the examination may be limited to a verification that the corrosion control arrangements remain effective.

205. All Units

Particular attention is to be given to corrosion control systems in ballast spaces, free-flooding areas and other locations subjected to sea water from both sides.

206. Surface type units

One peak tank and at least two other representative ballast tanks between the peak bulkheads used primarily for water ballast.

207. Self elevating units

Representative ballast tanks or free-flooding compartments in mat or spud cans, if accessible, and at least two representative hull pre-load tanks.

208. Column stabilized units

Representative ballast tanks in footings, lower hulls, or free-flooding compartments as accessible, and at least two ballast tanks in columns or upper hull, if applicable.

300. Ballast Spaces

301. In conjunction with Drydocking Surveys (or equivalent) after Special Survey No. 1 and between subsequent Special Surveys, the following ballast spaces are to be internally examined, thickness gauged, placed in satisfactory condition as found necessary, and reported upon. If such examination reveals no visible structural defects, the examination may be limited to a verification that the corrosion control arrangements remain effective.

302. All Units

Particular attention is to be given to corrosion control systems in ballast spaces, free-flooding areas and other locations subjected to sea water from both sides.

303. Surface type units

One peak tank and at least two other representative ballast tanks between the peak bulkheads used primarily for water ballast.

304. Self elevating units

Representative ballast tanks or free-flooding compartments in mat or spud cans, if accessible, and at least two representative hull pre-load tanks.

305. Column stabilized units

Representative ballast tanks in footings, lower hulls, or free-flooding compartments as accessible, and at least two ballast tanks in columns or upper hull, if applicable.

C2. TAILSHAFT SURVEYS

100. Schedule

101. Refer to Part II, Title 02, Section 2, Chapter C, C.2 of the Ship Rules.

200. Extension of Intervals of Tailshaft Surveys

201. Surveys are to be carried out in accordance with the Ship Rules as above, except that in the case of Mobile Offshore Drilling Unit, due to low running hours on tailshafts, extended intervals between tailshaft surveys may be considered based on:

- a. Satisfactory diver's external examination of stern bearing and outboard seal area including wear-down check as far as is possible.
- b. Internal examination of the shaft area (inboard seals) in propulsion room(s).
- c. Confirmation of satisfactory lubricating oil records (oil loss rate, contamination).
- d. Shaft seal elements are examined/replaced in accordance with seal manufacturer's recommendations.

C3. UNDERWATER INSPECTION *IN LIEU OF* DRYDOCKING SURVEY [URZ 15]

100. General

101. Units designed to operate for long periods without dry-docking shall be provided with procedures destined to carry out underwater inspections *in lieu of* dry-docking surveys. [NORMAM 01]

- a. The procedures established for that purpose shall be analyzed and approved by the RBNA, therein included continuous surveys. [NORMAM 01]

- b. Such procedures as mentioned in C5.101.a above are to be included in the Operational Manual and the documentation thereby originated shall be kept on board, available for the surveyors. [NORMAM 01]

- c. Following are the procedures and conditions under which a properly conducted underwater inspection may be credited as equivalent to a Drydocking Survey

200. Conditions

201. Limitations

Underwater Inspection in lieu of Drydocking Survey may not be acceptable where there is record of abnormal deterioration or damage to the underwater structure; or where damage affecting the fitness of the unit is found during the course of the survey.

202. Thickness Gauging and Non-Destructive Testing

Underwater of internal thickness gaugings of suspect areas may be required in conjunction with the underwater inspection. Means for underwater non-destructive testing may also be required for fracture detection.

203. Plans and Data

Plans and procedures for the Drydocking Survey (Underwater Inspection) are to be submitted for review in advance of the survey and made available on board. These shall include drawings or forms for identifying the areas to be surveyed, the extent of underwater cleaning, non-destructive testing locations (including NDT methods), nomenclature, and for the recording of any damage or deterioration found.

204. Underwater Conditions

The areas to be surveyed are to be sufficiently clean and the sea water clear enough to permit meaningful examination and photograph (if necessary) by diver. Overall or spot cleaning may be required.

300. Physical Features

301. The following physical features are to be incorporated into the unit's design in order to facilitate the underwater inspection. When verified they will be noted in the unit's classification for reference at subsequent surveys.

400. Hull In-Water Survey - VVCF

401. Stern Bearing

For self-propelled units, means are to be provided for ascertaining that the seal assembly on oil lubricated bearings is intact and for verifying that the clearance or wear-down of the stern bearing is not excessive. For use of the wear-down gauges, up-to-date records of the base depths are to be maintained on board. Whenever the stainless-steel seal sleeve is renewed or machined, the base readings for the wear-down gauge are to be re-established and noted in the unit's records and in the survey report.

402. Rudder Bearings

For self-propelled units with rudders, means and access are to be provided for determining the condition and clearance of the rudder bearings, and for verifying that all parts of the pintle and gudgeon assemblies are intact secure. This may require bolted access plates and a measuring arrangement.

403. Sea Suctions

Means are to be provided to enable the diver to confirm that the sea suction openings are clear. Hinged sea suction grids would facilitate this operation.

404. Sea Valves

For the Drydocking Survey (Underwater Inspection) associated with the Special Survey, means must be provided to examine any sea valve.

500. Procedures

501. Exposed Areas

An examination of the outside of the structure above the waterline is to be carried out by the RBNA's Surveyor. Means and access are to be provided to enable the Surveyor to accomplish visual inspection and non-destructive testing as necessary.

502. Underwater Areas

An examination of the entire unit below the waterline is to be carried out by an approved firm in accordance with UR Z17.

503. Damage Areas

Damage areas are to be photographed. Internal examination, measurements, marking and thickness gauging of such locations may be necessary as determined by the attending Surveyor. Means are to be provided for location, orienting and identifying underwater surfaces in photographs or on video tapes.

600. Alternatives

601. The RBNA is prepared to consider alternatives to the above guidelines including remotely operated vehicles, provided means and details for accomplishing results are not less effective.

700. Information Note:

701. This Chapter is applicable to all drilling unit types.

**CHAPTER D
HULL AND MACHINERY GENERAL
REQUIREMENTS FOR INTERMEDIATE SURVEYS**

CHAPTER CONTENTS

D1. INTERMEDIATE SURVEYS
REQUIREMENTS

**D1. INTERMEDIATE SURVEYS
REQUIREMENTS**

100. Intermediate survey requirements

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

102. The survey is in general carried out as an annual survey, but with extended visual inspection in particular regarding ballast and storage tanks which shall be inspected internally as per Table T.D1.102.1.

103. Machinery intermediate surveys are to be carried out as per Chapter B.

TABLE T.D1.102.1. – HULL INTERMEDIATE SURVEY SCOPE FOR SELF-ELEVATING UNITS

Item	5 < Age ≤ 10	10 < Age ≤ 15	Age > 15
Self-elevating units Ballast tanks and pre-load tanks in	Internal survey and thickness measurements of at least three representative ballast tanks Internal survey and thickness measurement at least two pre-load tanks. See notes 1, 2 and 3	Internal examination and thickness measurement of all spaces used for water ballast Internal examination and thickness measurement of all pre-load tanks. See notes 1 and 3	Internal examination and thickness measurement of all spaces used for water ballast Internal examination and thickness measurement of all pre-load tanks. See notes 1 and 3
Column-stabilized units Column ballast tanks (if accessible) and ballast tanks in lower hulls	Internal survey and thickness measurements of representative ballast tanks in lower hulls and, if accessible, at least two ballast tanks in columns See notes 1, 2 and 3	Internal survey and thickness measurements of representative ballast tanks in lower hulls and, if accessible, at least two ballast tanks in columns See notes 1 and 3	Internal survey and thickness measurements of representative ballast tanks in lower hulls and, if accessible, at least two ballast tanks in columns See notes 1 and 3
Floater units	Internal survey and thickness measurements of at least three representative ballast tanks Internal examination and thickness measurement peak tanks is to be carried out.	Internal examination and thickness measurement of all spaces used for water ballast Internal examination and thickness measurement peak tanks is to be carried out	Internal examination and thickness measurement of all spaces used for water ballast Internal examination and thickness measurement peak tanks is to be carried out
Storage tanks (where fitted)		Selected tanks internally examined	Selected tanks internally examined
<p>Note 1 - If such examinations reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains effective, and the thickness measurements are not required.</p> <p>Note 2 - 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.</p> <p>Note 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</p> <p>Note 4 – Areas found suspect at previous surveys are to be surveyed in accordance with the provisions indicated in Part II, Title 02, Section 2, subchapter D2.400 of the Ship Rules.</p> <p>Note 5 – In application of the above, 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</p>			

CHAPTER E
HULL AND MACHINERY GENERAL
REQUIREMENTS FOR RENEWAL SURVEYS

CHAPTER CONTENTS

- E1. GENERAL SURVEY AND CERTIFICATION SCHEDULE
- E2. RENEWAL HULL SURVEYS – ALL UNITS
- E3. RENEWAL MACHINERY SURVEYS – ALL UNITS
- E4. ADDITIONAL REQUIREMENTS FOR HULL RENEWAL SURVEYS OF SELF-PROPELLED OR SURFACE UNITS (FLOATERS)
- E5. ADDITIONAL REQUIREMENTS FOR HULL RENEWAL SURVEYS OF COLUMN-STABILIZED UNITS
- E7. ADDITIONAL REQUIREMENTS FOR RENEWAL INSPECTION OF SELF-ELEVATING UNITS
- E8. THERUSTER INSTALLATIONS
- E9. SPECIAL FEATURES – HAZARDOUS AREAS RENEWAL SURVEY
- E10. RENEWAL BOILER SURVEYS
- E11. DRILLING SYSTEM RENEWAL SURVEY
- E12. WELL CONTROL RENEWAL SURVEY

E1. RENEWAL SURVEY - GENERAL

100. Schedule

101. Renewal Surveys are to be carried out at 5 years intervals to renew the Classification Certificate.

102. The first Renewal 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 Renewal Survey. However, an extension of class of 3 months maximum beyond the 5th year can be granted in exceptional circumstances. In this case, the next period of class will start from the expiry date of the Renewal Survey before the extension was granted.

103. For surveys completed within 3 months before the expiry date of the Renewal Survey, the next period of class will start from the expiry date of the Renewal Survey. For surveys completed more than 3 months before the expiry date of the Renewal Survey, the period of class will start from the survey completion date.

104. The Renewal Survey may be commenced at the 4th Annual Survey and be progressed with a view to completion by the 5th anniversary date. When the Renewal Survey is commenced prior to the 4th Annual Survey, the entire survey is to be completed within 15 months if such work is to be credited to the Renewal Survey.

105. A survey planning meeting is to be held prior to the commencement of the survey.

106. Concurrent crediting to both Intermediate Survey (VIC) and Renewal Survey (VRC, VRM) for surveys and thickness measurements of spaces are not acceptable.

E2. RENEWAL HULL SURVEYS – ALL UNITS

100. Special Survey No. 1

101. All Drilling Units

- a. The hull or platform structure including tanks, watertight bulkheads and deck, cofferdams, void spaces, sponsons, chain lockers, duct keels, helicopter deck and its supporting structure, machinery spaces, peak spaces, steering gear spaces, and all other internal spaces are to be examined externally and internally for damage, fractures, or excessive wastage. Thickness gauging of plating and framing may be required where wastage is evident or suspected.
- b. All tanks, compartments and free-flooding spaces throughout the drilling unit are to be examined externally and internally for excess wastage or damage.
- c. Internal examinations of spud cans and mats are to be specially considered.
- d. Watertight integrity of tanks, bulkheads, hull, decks and other compartments is to be verified by visual inspection.
- e. Suspect areas may be required to be tested for tightness, non-destructive tested or thickness gauged.
- f. Tanks and other normally closed compartments are to be ventilated, gas freed and cleaned as necessary to expose damages and allow meaningful examination and thickness gauged in case of excessive wastage.
- g. Internal examination and testing of void spaces, compartments filled with foam or corrosion inhibitors, and tanks used only for lube oil, light fuel oil, diesel oil, or other non-corrosive products may be waived provided that upon a general examination the Surveyor considers their condition to be satisfactory.

External thickness gauging may be required to confirm corrosion control.

- h. Structures such as derrick substructure and supporting structure, jack-houses, deck houses, superstructures, helicopter landing areas, raw water (sea water intake) towers and their respective attachments to the deck or hull.
- i. Windlass and attachments of anchor racks and anchor cable fairleads.
- j. Foundations and supporting headers, brackets, and stiffeners for drilling related apparatus, where attached to hull, deck, superstructure or deck house.
- k. Thickness gaugings are to be carried out where wastage is evident or suspect.
- l. Temporary mooring: 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 Renewal Survey No. 2 and subsequent Renewal Surveys, chain cables are to be gauged and renewed in cases where their mean diameter is worn below the limits allowed by the Society.

102. **Surface-type Units:** Structural appendages and ducts for positioning units.

200. Special Survey No. 2 and Subsequent Special Surveys - Hull, Structure and Equipment

201. These Surveys are to be at least as comprehensive as Special Survey No. 1, with special attention being given to the condition and thickness of material in high corrosion areas. Representative gaugings will be required. These gaugings will be specified in advance by the RBNA.

202. Special attention shall be paid to splash zones on structure, legs or related structure, and in ballast tanks, pre-load tanks, free-flooding spaces, spud cans and mats.

300. Lightweight test

301. A lightweight survey or inclining test shall be conducted at the first renewal survey. If a lightweight survey is conducted and it indicates a change from the calculated light ship displacement in excess of 1% of the operating displacement, an inclining test shall be conducted, or the difference in weight shall be placed in an indisputably conservative vertical centre of gravity and approved by the Administration.

302. If the survey or test at the first renewal survey demonstrated that the unit was maintaining an effective weight control programme, and at succeeding renewal surveys this is confirmed by the records (*), light ship displacement may be verified in operation by comparison of the calculated and observed draught. Where the difference between the expected displacement and the

actual displacement based upon draught readings exceed 1% of the operating displacement, a lightweight survey shall be completed in accordance with D2.301.

(*)*A record of all changes to machinery, structure, outfitting and equipment that affect the light ship data shall be maintained in a light ship data alterations log and be taken into account in daily operations.*

303. The inclining test or lightweight survey shall be carried out in the presence of a RBNA surveyor.

E3. RENEWAL MACHINERY SURVEYS – ALL UNITS

100. Machinery Class Renewal Survey – from VRM1 on

101. Machinery installations of all types of drilling Units are to undergo Special Surveys at intervals similar to those for Special Survey on the hull, in order that both may be recorded at approximately the same time.

102. **Non-Self-Propelled Units:** In addition to the requirements for Annual Surveys, at each Special Survey, special attention is to be given to the following items as applicable:

- a. All openings to the sea, including sanitary and other overboard discharges, together with cocks and valves connected therewith are to be examined internally and externally while the unit is in drydock, or at the time of underwater examination in lieu of drydocking, and the fastenings to the shell plating are to be renewed when considered necessary by the Surveyor.
- b. Pumps and pumping arrangements, including valves, cocks, pipes and strainers are to be examined. Non-metallic flexible expansion pieces in the main salt water circulating system are to be examined internally and externally. The Surveyor is to be satisfied with the operation of the bilge and ballast systems. Other systems are to be tested as considered necessary.
- c. The foundations of machinery are to be examined.
- d. Heat exchangers and other unfired pressure vessels within the scope of classification are to be examined, opened out or thickness gauged and pressure tested as considered necessary, and associated relief valves proved operable. Evaporators that operate with a vacuum on the shell need not be opened, but may be accepted on basis of satisfactory external examination and operational test or review of operating records.

103. - **Electrical Equipment:** In addition to the requirements for Annual Surveys, at each Special Survey, special attention is to be given to the following items as applicable:

- a. Fittings and connections on main switchboards and distribution panels are to be examined, and care is to be taken to see that no circuits are overfused.
- b. Cables are to be examined as far as practicable without undue disturbance of fixtures.
- c. All generators are to be run under load, either separately or in parallel. Switches and circuit breakers are to be tested.
- d. All equipment and circuits are to be inspected for The insulation resistance of the circuits is to be measured between conductors and between conductors and ground and these values compared with those previously measured.
- e. Electrical auxiliaries installed for vital purposes, generators and motors are to be examined and their prime movers opened for inspection. The insulation resistance of each generator and motor is to be measured.
- f. The windings of main propulsion generators and motors are to be thoroughly examined and found or made dry and clean. Particular attention is to be paid to the ends of all windings of stators and rotors.

104. Shipboard Automatic and Remote-Control Systems

In addition to the requirements of Annual Surveys the following parts are to be examined:

- a. Control Actuators: All mechanical, hydraulic, and pneumatic control actuators and their power systems are to be examined and tested as considered necessary.
- b. Electrical equipment: The insulation resistance of the windings of electrical control motors or actuators is to be measured, with all circuits of different voltages above ground being tested separately to the Surveyor's satisfaction.
- c. Unattended Plants: Control systems for unattended machinery spaces are to be subjected to dock trials at reduced power on the propulsion engine to ensure the proper performance of all automatic functions, alarms and safety systems.

E4. ADDITIONAL REQUIREMENTS FOR HULL RENEWAL SURVEYS OF SELF-PROPELLED OR SURFACE UNITS (FLOATERS)

100. Self-Propelled Units

101. The hull survey extension is to be in accordance the present Subchapter E4.

102. 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 Renewal Survey No. 2 and subsequent Renewal Surveys, chain cables for temporary mooring are to be gauged and renewed in cases where their mean diameter is worn below the limits allowed by the Society.

103. 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 suction, 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.

104. **Testing of tanks:** 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.

105. Thickness measurements are to be carried out in accordance with Table T.E4.105.1. 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. These extended thickness measurements are to be carried out before the survey is credited as completed.

106. 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.

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

108. Automatic air pipe heads are to be completely examined (both externally and internally as indicated in Table T.E4.108.1.

109. 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.

110. Fuel and oil tanks are to be inspected according to Table T.E4.110.1.

200. Units with Propulsion - Assist or Dynamic Position

201. Propulsion-assist and dynamic positioning equipment shall be surveyed on the basis of Special Periodical Survey-Machinery in accordance with the requirements of the RBNA, Part II, Title 11, Section 5, Chapter of the Ship Rules..

TABLE T.E4.105.1 MINIMUM REQUIREMENTS FOR THICKNESS MEASUREMENTS AT RENEWAL SURVEY SELF-PROPELLED OR SURFACE UNITS (FLOATERS)

Renewal Survey No.1 VRC1 Age ≤5	Renewal Survey No.2 VRC2 5 <Age ≤10	Renewal Survey No.3 VRC3 10 <Age ≤15	Renewal Survey No.4 and Subsequent VRC4 15 <Age
1) Suspect areas throughout the vessel.	1) Suspect areas throughout the vessel. 2) External shell plating and strength deck plating: measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses	1) Suspect areas throughout the vessel. 2) External shell plating and strength deck plating: measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses 3) Bulkhead plating and internal structural members which present corrosion wear	1) Suspect areas throughout the vessel. 2) External shell plating and strength deck plating: measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses 3) Bulkhead plating and internal structural members which present corrosion wear
	3) 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.
	4) Moon pool boundary bulkhead plating	3) All cargo hold hatch covers and coamings (plating and stiffeners).	3) All cargo hold hatch covers and coamings (plating and stiffeners).
		4) Internals in forepeak and after peak tanks.	4) Internals in forepeak and after tanks
		4) Moon pool boundary bulkhead plating	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 sea chests. Shell plating in way of overboard discharges as considered necessary by the attending surveyor
			4) Moon pool boundary bulkhead plating

- 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.

TABLE T.E4.108.1 SURVEY REQUIREMENTS FOR AUTOMATIC PIPE HEADS (*) AT RENEWAL SURVEYS

Renewal Survey VRC1 Age < 5	Renewal Survey VRC2. 2 5 <Age ≤10	Renewal Survey VRC3 and VRC4 Age >10
<p>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.</p> <p>- 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.</p> <p>(1) (2)</p>	<p>- All air pipe heads located on the exposed decks in the forward 0.25L.</p> <p>- At least 20% of air pipe heads on the exposed decks serving spaces aft of 0.25 L, preferably air pipes serving ballast tanks</p> <p>(1) (2)</p>	<p>- All air pipe heads located on the exposed decks</p>
<p>(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.</p>		

TABLE T.E4.110.1 MINIMUM REQUIREMENTS FOR INTERNAL EXAMINATION AT HULL RENEWAL SURVEYS OF FUEL OIL, LUBE OIL AND FRESH WATER TANKS

Tank	Renewal Survey VF No. 1 Age ≤ 5	Renewal Survey No. 2 5 <Age ≤10	Renewal Survey No. 3 10 <Age ≤15	Renewal Survey No. 4 and Subsequent Age > 15
Fuel Oil Bunker tanks				
-Engine Room	None	None	One	One
- Cargo Length Area	None	One	Two	Half the total, minimum 2
Lube Oil	None	None	None	One
Fresh water	None	One	All	All
<p>Notes</p> <p>1) These requirements apply to tanks of integral (structural) type.</p> <p>2) If a selection of tanks is accepted to be examined, then different tanks are to be examined at each Renewal survey, on a rotational basis.</p> <p>3) Peak tanks (all uses) are subject to internal examination at each Renewal survey.</p> <p>4) At Renewal surveys no 3 and subsequent surveys, one deep tank for fuel oil in the cargo length area is to be included, if fitted</p>				

E5. ADDITIONAL REQUIREMENTS FOR HULL RENEWAL SURVEYS OF COLUMN-STABILIZED UNITS

100. Column-Stabilized Units:

101. In addition to the requirements of D.2. above, the following is to be inspected.

- a. Connections of columns and diagonals to upper hull, structure or platform and lower hull, structure or pontoons.
- b. Shell of columns and diagonals to upper hull, structure or platform and lower hull, structure or pontoons.
- c. Joints (intersections) of supporting structure including diagonals, braces and horizontals, together with gussets and brackets.

- d. Internal continuation or back-up structure for the above.
- e. Sections of the deck plating which form part of the “box” or “I” platform which receive most of the concentrated load.
- f. External brackets, bulkheads and frames.
- g. Bulkheads and stiffeners
- h. Deckhouses

102. Thickness measurements are to be in accordance with Table T.E5.102.1 below.

TABLE T.E5.102.1 MINIMUM REQUIREMENTS FOR THICKNESS MEASUREMENTS AT SPECIAL (RENEWAL) SURVEY COLUMN-STABILIZED UNITS

Renewal Survey No.1 VRC1 Age ≤5	Renewal Survey No.2 VRC2 5 <Age ≤10	Renewal Survey No.3 VRC3 10 <Age ≤15	Renewal Survey No.4 and Subsequent VRC4 15 <Age
Suspect areas throughout the vessel.	Suspect areas throughout the vessel.	Suspect areas throughout the vessel.	Suspect areas throughout the vessel.
Upper hull, structure or platform	Upper hull, structure or platform 1) Representative plates in the splash area and internal structure measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses 2) One transverse section	Upper hull, structure or platform 1) Representative plates in the splash area and internal structure measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses 3) Two transverse sections	Upper hull, structure or platform 1) Representative plates in the splash area and internal structure measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses 2) Connections of columns and diagonals to upper hull structure and platform ("k" nodes) 3) Three transverse sections
Lower hull, structure or pontoons	Lower hull, structure or pontoons 1) Representative plates in the splash area measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses 2) One transverse section within the amidships 0.5L in each pontoon or lower hull.	Lower hull, structure or pontoons 1) Representative plates in the splash area measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses 2) Two transverse sections within the amidships 0.5L in each pontoon or lower hull	Lower hull, structure or pontoons 1) Representative plates in the splash area measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses 2) Three transverse sections within the amidships 0.5L in each pontoon or lower hull
Bracings	Bracings 1) Representative plates in the splash areas	Bracings 1) Connections of columns and diagonals to upper hull structure and platform ("k" nodes)	Bracings 1) Connections of columns and diagonals to upper hull structure and platform ("k" nodes)

200. Lightweight survey

201. A lightweight survey or inclining test shall be carried out in the presence of a RBNA surveyor at the first renewal survey. If a lightweight survey is conducted and it indicates a change from the calculated light ship displacement in excess of 1% of the operating displacement, and inclining test shall be conducted or the difference in weight shall be placed in an indisputably conservative vertical centre of gravity and approved by the RBNA.

202. If the survey or test at the first renewal survey demonstrated that the unit was maintaining an effective weight control and at succeeding renewal surveys this is confirmed by the records, light ship displacement may be verified in operation by comparison of the calculated and observed draught. Where the difference between the expected displacement and the actual displacement based

upon draught readings exceed 1% of the operating displacement a lightweight survey shall be completed in accordance with E4.201.1

E6. ADDITIONAL REQUIREMENTS FOR HULL RENEWAL SURVEYS OF SELF ELEVATING UNITS

102. A selected number of jacking gear units not less than one unit per leg shall be opened up for inspection.

103. Oil analysis shall be presented for all the jacking gear units.

104. The inspection shall include the following:

- a. Gears: visual examination

- b. Gear boxes: open for visual examination
 - c. Braking systems: opening and visual examination. The brake torques of jacking machinery on self-elevating units shall be checked.
 - d. Survey and NDT of jacking guides as far as possible
105. Oil samples are to be collected directly after a jacking operation to ensure representative values
106. For units with hydraulic cylinders for lifting the working and holding pins are to be examined by NDT. The working and holding yokes are to be tested for cracks by NDT.
107. For self-elevating units, all parts of the legs shall be examined.

100. Self-Elevating Units

101. All legs, including chords, diagonal and horizontal braces, gussets, racks, joints, together with leg guides are to be examined. Tubular or similar type legs are to be examined externally and internally, together with internal stiffeners and pinholes as applicable.

102. Structure in, around and under jack-house and leg walls. Non-destructive testing of suspect areas may be required

103. Leg jacking or other elevating systems externally.

104. Leg connections to bottom mats or spud cans, including non-destructive testing of leg connections to mats or spud cans.

105. Jetting piping systems or other external piping, particularly where penetrating mats or spud cans.

106. **Spud cans or mats:** Where the spud cans or mat are partly or entirely obscured below the mud line where the Special Survey is otherwise being completed, consideration will be given to postponement of the examinations until the next Rig move.

TABLE T.E6.101.1 MINIMUM REQUIREMENTS FOR THICKNESS MEASUREMENTS AT SPECIAL(RENEWAL) SURVEY SELF-ELEVATING UNITS

Renewal Survey No.1 VRC1 Age ≤5	Renewal Survey No.2 VRC2 5 <Age ≤10	Renewal Survey No.3 VRC3 10 <Age ≤15	Renewal Survey No.4 and Subsequent VRC4 15 <Age
Suspect areas throughout the vessel.	Suspect areas throughout the vessel.	Suspect areas throughout the vessel.	Suspect areas throughout the vessel.
Upper hull	Upper hull, structure or platform 1) Representative plates in the splash area and internal structure measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses 2) One transverse section	Upper hull, structure or platform 1) Representative plates in the splash area and internal structure measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses 2) Two transverse sections	Upper hull, structure or platform 1) Representative plates in the splash area and internal structure measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses 2)Connections of columns and diagonals to upper hull structure and platform ("k" nodes) 3) Three transverse sections
Legs	Legs 1) Representative plates in the splash area by an approved method in at least four (4) points per plate to confirm the actual thicknesses 2) One transverse sections, including representative chords and bracings in way of the splash zone	Legs 1) Representative plates in the splash area by an approved method in at least four (4) points per plate to confirm the actual thicknesses 2) Two transverse sections, including representative chords and bracings in way of the splash zone	Legs 1) Representative plates in the splash area and internal structure measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses 2) Three transverse sections, including representative chords and bracings in way of the splash zone
Jackhouse and leg guides			
Mats or spudcams	1) Representative Plates bulkheads and internal structure measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses	1) Representative Plates bulkheads and internal structure measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses	1) All plates bulkheads and internal structure measurements by an approved method in at least four (4) points per plate to confirm the actual thicknesses

E7. SPECIAL FEATURES – HAZARDOUS AREAS RENEWAL SURVEY

100. Special Features (All Types)

101. Mobile Offshore Drilling Units may have many items of machinery and electrical equipment not found on conventional vessels. Certain of these items are required for classification even if the unit is without propulsion machinery. Items to be especially examined and reported upon at all Renewal Surveys are as follows:

102. Hazardous Areas: Enclosed hazardous areas such as those containing open active:

- mud tanks,

- shale shakers,

- degassers and

- desanders

are to be examined and doors and closures in boundary bulkheads verified as effective.

103. Electric lighting, electrical fixtures, and instrumentation are to be examined, proven satisfactory and verified as explosion-proof or intrinsically safe.

104. Ventilating systems including ductwork, fans, intake and exhaust locations for enclosed restricted areas are to be examined, tested and proven satisfactory.

105. Ventilating air alarm systems to be proven satisfactory.

106. Electrical motors are to be examined including closed-loop ventilating systems for large D-C motors.

107. Automatic power disconnect to motors in case of loss of ventilating air is to be proved satisfactory.

108. Remote shutdown for fuel-oil transfer service pumps and ventilating equipment, together with oil tank outlet valves where required to be capable of being remotely closed are to be proved satisfactory.

109. Emergency switch(s) for all electrical equipment including main and emergency generators, except alarm and communication systems and lighting in vital areas such as escape routes and landing platforms, are to be proved satisfactory.

110. **Fire Fighting Apparatus** - A general examination of the fire detection and extinguishing apparatus is to be made in order that the Surveyor may be satisfied with its efficient state. The following items are to be especially examined:

- a. Fire hoses, nozzles, and spanners at each fire station.
- b. Servicing of all portable soda-acid and foam extinguishers.
- c. Weighing and re-charging as necessary of all dry chemical and CO₂ extinguishers.
- d. Fire pumps and piping including operation and capacity.
- e. Alarm systems

111. **Self-Elevating Systems** - On self elevating type Mobile Offshore Drilling Units, the elevating systems are to be examined and reported on. Pinions and gears of the climbing pinion gear train of rack and pinion systems are to be examined, as far as practicable, to the Surveyor's satisfaction by an effective crack detection method.

112. **Piping Systems** - Piping systems used solely for drilling operations and complying either with the RBNA's requirements or a recognized standard are to be examined, as far as practical, operationally or hydrostatically tested to working pressure, to the satisfaction of the Surveyor.

113. Miscellaneous - Bilge alarm systems, if fitted, to be tested.

E8. THRUSTER INSTALLATIONS

100. Thruster installations

101. When the unit is equipped with thruster installations, the class renewal survey is also to include:

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

E9. BOILER SURVEYS

100. Schedule

101. Boiler Surveys are to be carried out according to the schedule found in Part II, Title 02, Section 2, Chapter C, C.8. of the Ship Rules.

201. At each Boiler Survey the boilers, superheaters, and economizers are to be examined internally (water-steam side) and externally (fire side).

202. Boiler mountings and safety valves are to be examined at each Boiler Survey and opened as considered necessary by the Surveyor.

203. The proper operation of the safety valves is to be confirmed at each survey.

204. When considered necessary by the Surveyor, the boilers and superheaters are to be subjected to hydrostatic pressure test.

E10. DRILLING SYSTEM RENEWAL SURVEY

100. General

101. This Subchapter D10 is additional to the requirements for inspections and tests of Chapter B.

102. Due to the fact that the equipment on MODU may present different features, in special the BOP's, the survey activities are described, but not limited to, the lists that follow.

103. Reference is made to:

- IACS UR Z15, "Hull, Structure, Equipment and Machinery Surveys of Mobile Offshore Drilling Units"
- IMO MODU Code ,
- API RP53
- KINGDOM DRILLING – UK – "Drilling Rig Acceptance Standards" by Peter Aird

upon which the checklists have been developed.

104. Where equipment or components are disassembled for overhaul or inspection, parts such as valve seats, ring grooves, piston rods, rams, bolts, welding, axle, keys, flanges, etc. are to be submitted to NDT tests such as ultrasound, dye penetrant, magnetic particle and other.

200. Structure & hoisting

201. In addition to the requirements of Chapter B, the renewal survey of the structure for the drilling system consists- but is not limited to – of the following:

- a. Check the records of the routine check of the torqueing of structural bolts
- b. NDT 100% checks on main structural components
- c. NDT spot checks at dismantled bolts and gauge threads

202. In addition to the requirements of Chapter B, the renewal survey of the hoisting system consists of:

- a. Check of the records of maintenance
- b. Check the records of routine NDT inspections
- c. Close visual inspection of sheaves, blocks, rings, padeyes
- d. Visual inspection and NDT tests as necessary of the draw-works fixing bolts
- e. Overhaul of all major components
- f. Overhaul of the traveling block or the in the presence of a RBNA surveyor

- g. Confirm the correct torque of deadline clamp bolts
- h. Calibration and adjustment of load limiting valves and limit switches for all winches, overhead cranes, etc.
- i. Load test of all lifting appliances in accordance with the RBNA Guide for Lifting Appliances
- j. Crown block: Bearing and sheave

300. Floating Offshore Drilling Rigs (Floaters) specific inspections

301. In addition to the requirements of Chapter B, the renewal survey of the structure for the drilling system for floaters consists- but is not limited to - of the following::

302. Moonpool

- a. Visual and NDT inspection of the hull and deck structure around the drilling well (moon-pool) and in vicinity of any other structural changes in section, slots, steps, or openings in the deck or hull and the back-up structure in way of structural members or sponsons ^(*) connecting to the hull (see D4).

303. **Heave compensation and top drive:**

- a. Thickness measurements shall be taken
- b. Pressure testing to maximum working pressure of installed piping
- c. Check of records of regular testing of the Pressure Safety Valves (PSV) valves in the system and confirm settings
- d. Check records of maintenance (wires, sheaves, etc.), with NDT of sheave grooves and external welds of sheaves if found worn
- e. Check records of calibration of accumulator pistons
- f. Check records of refilling of the hydraulic system to confirm the system internal leakage rate
- g. Operational test of any compressors or auxiliary machinery with particular attention to safety features
- h. Operational test of main valve control and indicators
- i. Test proper operation of anti-recoil valves
- j. Check foundation fastening
- k. Sheaves are to be visually inspected and submitted to NDT
- l. Perform a motion compensation function test according to OEM recommendations for active heave compensation systems.
- m. Certificates for all safety valves shall be presented

304. Riser tensioner

- a. Thickness measurement to be taken
- b. Pressure testing to maximum working pressure of installed piping
- c. Stroking of tensioners to confirm free movement
- d. Review records of regular testing, internal inspection and operation of safety features of:
 - v. Air compressors
 - vi. Accumulator bottles
 - vii. Pressure vessels
 - viii. Control panels
- e. Check the end terminations of all wire ropes
- f. Inspect internally the pressure vessels
- g. Operational test of compressors and the relief valves are to be checked
- h. Overhaul and test of the recoil valves, where fitted
- i. Operational test of the tensioner system
- j. Testing of the control system

305. Inspect sheaves, alignment with NDT testing where sheave grooves and external weld found worn

306. Inspection of wires and associated clips

307. Check for functioning of anti-recoil valves (slingshot/Olmsted valves)

308. Check foundation fastening

400. Rotary equipment

401. In addition to the requirements of Chapter B, the renewal survey of the rotary equipment consists- but is not limited to - of the following:

- a. Overhaul of the major equipment in the presence of a RBNA surveyor
- b. NDT testing of top drive dolly and guide tracks
- c. Confirm operation of rotary table safety features
- d. Confirm calibration of the driller's console torque and RPM indicators
- e. Examine pin for wear
- f. Pressure test of pipework to maximum working pressure for 15 minutes

500. Circulation system

501. In addition to the requirements of Chapter B, the renewal survey of the structure for the rotary equipment consists- but is not limited to - of the following::

- a. Each high-pressure mud hose assembly shall be hydrostatically tested to two times the working pressure. The test medium shall be water.
- b. Each cement hose assembly having a working pressure less than 69 MPa shall be hydrostatically tested to one and a half times the working pressure. Test medium shall be held for 15 minutes. The test medium shall be water.
- c. General visual survey
- d. Check the records of maintenance
- e. For mud pumps, visual survey and check records of maintenance (fluid ends and safety pop-off valves)
- f. For mud pits check records of regular testing of overboard dump valves in the mud pits
- g. Check records of maintenance for the valve in the drill string
- h. Check for leaks in the suction and discharge lines
- i. Thickness measurement of pipes, of the gooseneck and pressure test of hoses and their end connections
- j. Check internally, as far as possible the general condition of shale shaker, desander, desilter and degaser.

600. BOP and Pipe handling

601. In addition to the requirements of Chapter B, the renewal survey of BOP and pipe handling equipment consists – but is not limited to – of the following:

- a. Visual inspection of wire ropes
- b. Inspect chains for wear, damage, corrosion
- c. Fasteners such as bolts, nuts, clevises and clevis pin
- d. Structures and weld attachments in the primary load path
- e. All installed load monitoring/indicating devices to be calibrated
- f. Breaks, pawl mechanisms and all fail-safe loading devices inspected and tested
- g. Load limiting devices such as circuit breakers, pressure regulating valves and relief valves tested
- h. Mechanical devices such as gear boxes, rack and pinion drives, level wind devices, linkages, breaking

mechanisms, drums, etc inspected for corrosion, deformation or damage

rated working pressure of the wellhead that the stack is installed on, whichever is lower

- i. Shafting, keys, keyways, spline drives, hubs, couplings and bearings
- j. Electrical motors, junction boxes, cables, generators, controls, instrumentation to be inspected for deterioration or damage (IR tested)
- k. Hydraulic pumps, motors, valves, piping, etc. inspected
- l. Pneumatic pumps, motors, valves, piping, etc. inspected
- m. Lifting appliances to be load tested.

- h. Diverter systems shall be pressure tested to a low pressure only (reference is made to API Recommended Practice 64). Magnetic particle tests shall be used to investigate critical areas for cracks. Interlocks shall be tested.
 - i. Annular BOPs, with a joint of drill pipe installed are tested to the test pressure applied to the ram BOPs or to a minimum of 70 percent of the annular preventer working pressure, whichever is the lesser.
 - j. The lower kelly valves, kelly, kelly cock, drill pipe safety valves, inside BOPs and top drive safety valves, shall be tested with water pressure applied from below to a low pressure of 200-300 psi (1.38 to 2.1 MPa) then to the rated working pressure. A stable high test pressure shall be maintained for at least 5 minutes.
 - k. The pressure test on hydraulic chambers of annular BOPs shall be carried out to at least 1,500 psi (10.3 MPa)
 - l. Initial pressure tests on hydraulic chambers of ram BOPs and hydraulically operated valves shall be to the maximum operating pressure recommended by the manufacturer. The test shall be run on both the opening and the closing chambers.
 - m. The initial pressure test on the closing unit valves, manifolds, gauges, and BOP hydraulic control lines shall be to the rated working pressure of the control unit.
 - n. The results of all BOP equipment pressure and function tests shall be documented and include, as a minimum, the testing sequence, the low and high test pressures, the duration of each test, and the results of the respective component tests.
 - o. Functional tests of the control system shall include a simulated loss of power to the control unit and to the control panel.
 - p. Vertical stack alignment shall be checked and flange bolt make-up shall be torqued to prescribed ratings established in API Specification 6A.
 - q. All diverter system components shall be inspected and tested to ascertain proper installation and functioning. Simulate loss of rig air supply to the diverter control system and determine, effects, if any, on the diverter system, vent line valves, and backup supply systems
 - r. A pressure integrity test [200 psi (1.38 MPa) minimum] shall be made on the diverter system after each installation.

E11. WELL CONTROL

101. The renewal survey of the well control system consists of the following requirements, which are additional to those of the annual survey in Chapter B, Subchapter B.8:

102. Blow out preventers

- a. After every 5 years of service, the BOP stack, choke manifold, and diverter components shall be disassembled and inspected in accordance an overhaul plan. The overhaul plan is to be submitted to RBNA previous to the test.
- b. Elastomeric components shall be changed out and surface finishes shall be examined for wear and corrosion. Critical dimensions shall be checked against the manufacturer's allowable wear limits. Individual components can be inspected on a staggered schedule
- c. A full internal and external inspection of the flexible choke and kill lines shall be performed in accordance with the equipment manufacturer's guidelines.
- d. Manuals or bulletins containing torque specifications shall be available on the unit.
- e. Blow out preventers are to be disassembled, internally inspected, dimensionally checked to OEM specifications.
- f. All blow-out prevention components that may be exposed to well pressure shall be tested first to a low pressure of 200 to 300 psi (1.38 to 2.1 MPa) and then to a high pressure. A stable low test pressure shall be maintained for at least 5 minutes
- g. The initial high pressure test on components that could be exposed to well pressure (BOP stack, choke manifold, and coke/kill lines) shall be carried out to the rated working pressure of the ram BOPs or to the

103. Surface BOP stack equipment

- a. Annular BOPs shall be tested with the smallest OD pipe to be used.

b. The capability of the shear ram and ram operator shall be verified with the BOP manufacturer for the planned drill string.

c. Flexible choke and kill lines shall be tested to the same pressure, frequency, and duration as the ram BOPs.

104. Chokes and choke manifolds for Surface BOP installations.

a. The choke manifold upstream of and including the lost high pressure valves (refer to API RP 53 figure 8) shall be tested to the same pressure as the ram BOPs.

b. Accumulator system for Surface BOP installations

c. Accumulator closing test. The purpose of this test is to verify that the accumulator system is properly sized to support the fluid volume and pressure requirements of the BOPs on the rig using the following procedure.

105. Thickness measurements of choke & kill equipment shall be carried out.

200. Emergency disconnect system (EDS)

201. All emergency disconnect system sequences to be function tested.

CHAPTER F GUIDELINES FOR THE SURVEY OF OFFSHORE MOORING CHAIN CABLE IN USE [IACS Rec 38]

CHAPTER CONTENTS

F1 SCOPE AND APPLICATION

F1. SCOPE AND APPLICATION

100. Application and Purpose

101. The information herein is intended to provide guidance to Surveyors for inspection of position mooring systems which have been classed by the RBNA for Mobile Offshore Drilling Units.

102. Temporary mooring equipment is to be surveyed under the Ship Rules.

200. Survey Interval, Purpose and Extent

201. Annual Surveys are to be conducted at approximately twelve (12) month intervals, with the vessel at operational draft, with the position mooring system in use.

202. The purpose of the Annual Survey is to confirm that the mooring system will continue to carry out its intended purpose until the next annual survey. No disruption of the unit's operation is intended. Ideally, the Annual Survey would be done during a relocation move.

203. The scope of the Annual Survey is limited to the mooring components adjacent to the winch or windlass. Depending on the mooring component visible from the unit, particular attention shall be given to:

- a. Chain
 - i. Wear on the chain shallers in way of the chain stopper and windlass pockets;
 - ii. Support of chain links in the windlass pockets.
- b. Wire Rope
 - i. Flattened ropes;
 - ii. Broken wires;
 - iii. Worn out or corroded ropes.

204. The surveyor shall determine if any problems have been experienced in the previous twelve (12) months period with the mooring system, e.g. breaks, mechanical damage, loose joining shackles, chain or wire jumping.

205. If the Annual Survey reveal severe damage or neglect to the visible part of chain or cable, a more extensive survey shall be performed.

206. Typical damage warranting a more comprehensive survey could be:

- a. Chain

- i. Reduction in diameter exceeding 4%;
 - ii. Missing studs;
 - iii. Loose studs in Grade 4 chain;
 - iv. Worn out cable lifters (i.e. gypsies) causing damage to the chain.
- b. Wire Rope
- i. Obvious flattening or reduction in area;
 - ii. Worn cable lifters causing damage to the wire rope;
 - iii. Severe wear or corrosion;
206. **Broken wires.**
- a. Special Periodical Surveys are carried out at intervals of approximately five (5) years and will require extensive inspection, usually associated with a sheltered water visit. When considered necessary by the RBNA, the interval between Special Periodical Surveys may be reduced.
 - b. The purpose of the Special Periodical Survey is to ensure that each chain is capable of performing its intended purpose until the next Special Periodical Survey, assuming that appropriate care and maintenance is performed on the mooring system during the intervening period.
207. The Special Periodical Survey shall include:
- a. Close visual examination of all links of mooring chains, with cleaning as required
 - b. Enhanced representative NDT sampling
 - i. 5% on general chains
 - ii. 20% on chain which has been in way of fairleads over last five (5) years
 - iii. All connecting links
 - a. Dimension checks, including length over five (5) links
208. Particular attention shall be given to:
- a. Those lengths of chain (or wire rope) which have frequently been in contact with the windlass and fairleads during the unit's operation since the last survey. The Surveyor shall ensure that these lengths are rated for use in the way of the windlass and fairlead.
 - b. The looseness and pin securing arrangements of the joining-shackles.
 - c. All windlass and fairlead chain pockets for:
 - i. Unusual wear or damage to pockets;
 - ii. Rate of wear on pockets, including relative rate of wear between links and pockets;
 - iii. Mis-match between links and pockets, and improper support of the links in the pockets.
- b. A functional test of the mooring system during anchor-handling operation for:
- a. Smooth passage of chain links and/or wire rope and joining-shackles over the windlass and fairleads pockets;
 - b. The absence of chain jumping or other irregularities.
209. The thickness (diameter) of approximately 1% of all chain links shall be measured. The selected links shall be approximately uniformly distributed through the working length of the chain. The above percentage may be increased/decreased if the visual examination indicates excessive/minimal deterioration.
210. All joining-shackles of the Kenter type and bolted type which have been in service for more than four (4) years shall be dismantled and an MPI performed on all machined surfaces as per 8.2.
211. Special Continuous Surveys
In lieu of a special periodic survey, the Owner may opt for a Continuous Survey, by providing an extra mooring line which may be regularly inspected on shore and exchanged with lines installed on the unit on an annual or other appropriate schedule.
- 300. Anchor Inspection**
301. The anchor head, flukes and shank shall be examined for damage, including cracks or bending. The anchor shackle pin and crown pin shall be examined and renewed if excessively worn or bent. Moveable flukes shall be free to rotate between stops on the anchor head.
302. Bent flukes or shanks shall be heated and jacked back in place according to an approved procedure, followed by Magnetic Particle Inspection.
- 400. Anchor Swivels**
401. Although swivels are no longer in common use, anchors have been lost due to corrosion of the threads engaging the swivel nut. These threads shall be carefully examined and, if significant corrosion is found, the swivel shall be removed or replaced.
- 500. Chain Inspection Criteria**
501. Chain Types Considered
This section applies only to "Offshore" or "Rig Quality" chains with studs secured by one of the following means:

- a. Mechanically locked adjacent to the link's (IACS R3 chain for example) flash-butt-weld and fillet welded on the other end
- b. Studs mechanically locked in place on both ends (IACS R4 chain for example)

502. Other types of chain will require special consideration.

503. The service environment of offshore mooring chain is more severe than the service environment for conventional ship anchoring chain. Offshore chain is exposed to service loads for a much longer period of time. The long term exposure to cyclical loadings in sea water magnifies the detrimental effect of geometric and metallurgical imperfections on fatigue life. Moreover the increased number of links in offshore chains renders the chain more susceptible to failure from a statistical standpoint.

504. Due to the effect of "notches", e.g. the stud footprint, higher strength steels, such as that used for IACS R4 chain, have a lower ratio of fatigue strength to static tensile strength than typical lower strength steel such as used for IACS R3 chain.

505. Chain Link Diameter Loss due to Abrasion and Corrosion

506. Diameter measurements shall be taken in the curved or bend region of the link and at any area with excessive wear or gouging. Particular attention shall be given to the 'shaller' areas which normally contact the windlass or fairlead pockets. with minimum cross-sectional area less than 90% of the original nominal area shall be rejected. If repair is permitted, it shall be done by qualified personnel using an approved procedure.

Guidance

WELD REPAIR IS NOT PERMITTED ON IACS R4, R4S and R5 CHAIN

A 5% reduction in diameter is equivalent to 10% of the reduction in cross-sectional area to original.

Two diameter measurements shall be taken 90 degrees apart and the average compared with original diameter considering with allowable diminution.

End of guidance

507. Chain Stud Defects and Repair or Replacement Studs prevent knots or twist problems during chain handling and support the sides of the links under load to reduce stretching and bending stresses, resulting in longer fatigue life. Links with missing studs shall be removed or the studs shall be refitted using an approved procedure.

508. Chain Studs Secured by Fillet Welds on one End

The stud is likely to fall out if it is loose or the weld is cracked.

509. Any axial or lateral movement is unacceptable and the link must be repaired or replaced.

510. Links with studs fillet welded on the flash-butt-weld end of the stud are unacceptable.

511. Rejection of links with gaps exceeding 3 mm (1/8 inch) between the stud and the link at the flash-butt-weld end of the stud shall be considered. Closing the gap by renewing the fillet weld may be considered, where permitted.

512. Field repair of cracked welds shall be avoided. Welding must be performed by qualified personnel using approved procedures.

Guidance

WELD REPAIR IS NOT PERMITTED ON IACS R4, R4S and R5 CHAIN

Chains with studs mechanically locked in place on both ends may only be repaired by an approved mechanical 'squeezing' procedure to reseat the stud.

End of guidance

513. Fillet welding of studs on both ends is not acceptable nor is welding on the stud end adjacent to the link's flash-butt-weld.

514. Existing studs with fillet welds on both ends will require special consideration and will be subject to special crack detection efforts. A reduction in mechanical properties in way of the flash-butt-weld will normally be required and approval of the coastal RBNA may also be required.

515. Chain Studs Secured by Press Fitting and Mechanical Locking

a. It is very difficult to quantify excessive looseness of chain studs. The decision to reject or accept a link with a loose stud must depend on the surveyor's judgment of the overall condition of the chain complement.

b. Axial movement of studs of 1 mm or less is acceptable. Links with axial movement greater than 2 mm must be repaired by 'squeezing' or removed. Acceptance of chain links with axial movements from 1 to 2 mm must be evaluated based on the environmental conditions of the unit's location and expected period of time before the chain is again available for inspection.

c. Lateral movement of studs up to 4 mm is acceptable.

516. Link Repairs

- a. Cracks, gouges and other surface defects (excluding weld cracks) may be removed by grinding provided the resulting reduction in link diameter does not exceed 5% and the cross-sectional area, due to abrasion, wear, and grinding is at least 90% of the original nominal area.
- b. Cross-sectional area shall be calculated for the lowest average of two diameters taken 90 degrees apart.
- c. Links with surface defects which cannot be removed by grinding shall be replaced.

517. Chain Link Replacement

Defective links shall be removed and replaced with joining-shackles, i.e. connecting links, guided by the following good marine practice:

- a. The replacement joining-shackle shall comply with IACS W22 or API 2F.
- b. Joining-shackles shall pass through fairleads and windlasses in the horizontal plane.

518. Since joining-shackles have much lower fatigue lives than ordinary chain links as few as possible shall be used. On average, joining-shackles shall be by 122 m (400 ft) or more apart.

519. If a large number of links meet the discard criteria and these links are distributed in the whole length, the chain shall be replaced with new chain.

600. Fairlead and Windlass Inspection - Chain Systems

601. Fairleads

- a. Inspection shall verify that all fairleads move freely about their respective Z-axes, to the full range of motion required for their proper operation. All bolts, nuts and other hardware used to secure the fairlead shafts shall be inspected and replaced, as required.
- b. Fairlead attachment to the hull shall be verified and NDT conducted, as necessary.

Guidance

There have been cases of closing plates on the fairlead shaft coming loose due to corrosion of the threads of the securing bolts, resulting in serious damage to the fairlead arrangements and the complete jamming of the fairlead and chain.

Consequently, the securing bolts shall also be checked to ensure that the bolt material does not corrode preferentially, shall the sacrificial anode system fail to function in way of the fairlead.

End of guidance

602. Windlasses

Special attention shall be given to the holding ability of the windlass. The chain stopper and the resultant load path to the unit's structure shall be inspected and its soundness verified.

603. Chain Pockets and Chain Support

- a. It is essential that a link resting in a chain pocket makes contact with the fairlead at only the four shaller areas of the link to avoid critical bending stresses in the link.
- b. Satisfactory chain support is to be verified, and excessive wear in the pockets shall be repaired as required, to prevent future damage to the chain.
- c. Chain pockets may be repaired by welding in accordance with the standard procedures supplied by the fairlead/windlass manufacturer. Normally, the hardness of the pockets shall be slightly softer than the hardness of the chain link, and procedures must be specific for the chain quality used.

700. Fairleads and Winches Inspection - Wire Rope Systems

701. Fairleads

See L1.601.

702. Winches

- a. Special attention shall given to the holding ability of the winch and the satisfactory operation of the pawls, ratchets and braking equipment. The soundness of the resultant load path to the unit's structure shall be verified.
- b. Proper laying down of the wire on the winch drum shall be verified to the satisfaction of the Surveyor, and drums and spooling gear adjustments made, if required.

800. Inspection of Jewellery and Miscellaneous Fittings

801. General

- a. Anchor shackles, large open links, swivels and connecting links shall be visually inspected.
- b. Certain areas shall be examined by MPI. Areas to be examined shall be clearly marked on each item. Links and fittings shall be dismantled, as required. Damaged items shall be replaced as required by the attending surveyor. Illustrations showing the areas of concern may be found in API RP 2I, Figure 7.
- c. General guidance on the areas requiring MPI is provided below:
 - i. Large open links: the interior contact surfaces of large open links

- ii. Bolted shackles: the inside contact areas and the pins
- iii. Swivels: the swivel pin and threads and mating surface

802. Joining Shackles (Connecting Links)

- a. Experience has shown that an undue number of anchors and chains have been lost due to connecting link failure. Joining-shackles used for higher strength chains, such as ORQ and above, which do not have certificates of equivalent quality shall receive special attention.
- b. Magnetic Particle Inspection
- c. All joining-shackles of Kenter or similar design which have been in service for more than four (4) years shall be dismantled and MPI carried out. Illustrations showing the areas of concern may be found in API RP 2I, Figure 7.
- d. General guidance on the areas requiring MPI is provided below:
 - i. Joining shackle links: all machined and ground surfaces of the link and the sides of the curved portions of the link
 - ii. Joining shackle stud: machined surfaces only
 - iii. Joining shackle pin: 100%

803. Fatigue is considered to be the critical criteria in way of the machined surfaces. On the remaining surface, the profile shall be ground smooth and MPI shall be carried out upon completion of grinding. In general, the radius of the completed grinding operation shall produce a recess with a minimum radius of 20 mm and a length along the link bar greater or equal to six times its depth.

Guidance

Sandblasting prior to MPI may damage the machined surfaces and shall be avoided. Alternative methods of cleaning shall be used. The maximum permissible depth of grinding is 5% of the nominal diameter. The minimum acceptable cross-sectional area in way of the grinding repair, due to the combined effect of local grinding and general corrosion/abrasion is 90% of the nominal cross-sectional area.

The minimum acceptable diameter in way of the grind repair, due to the combined effect of local grinding and general corrosion/abrasion, is 95% of the nominal diameter.

End of guidance

804. General Corrosion/Abrasion

The minimum acceptable cross-sectional area due to generally uniform corrosion/abrasion is 90% of the nominal cross-sectional area (equivalent to an uniform 5% reduction in diameter).

805. Tapered pins holding the covers of connecting links together shall make good contact at both ends and the recess of counterbore at the large end of the pin holder shall be solidly plugged with a peened lead slug to prevent the pin from working out.

806. Looseness Upon Re-Assembly

Any joining-shackles of Kenter or similar designs which are loose upon re-assembly shall be accepted only after special consideration in each case.

Guidance

Looseness between the mating faces will significantly reduce the remaining fatigue life of a joining-shackle. Stud movement in the longitudinal direction of the stud of more than 0.5 mm is also likely to significantly reduce the remaining fatigue life of a joining-shackle.

End of guidance

900. Wire Rope Surveys

901. Acceptance Criteria

- a. Acceptance criteria shall be guided by ISO-Standard 4309. Further insight may be gained from the 'discard' guidance provided by API RP 2I, Figures 18 and 19.
- b. It shall be borne in mind that ISO-Standard 4309 is primarily intended for lifting appliances where the Factor of Safety may be higher than for mooring wires.
- c. The Surveyor shall exercise great care in his interpretation of the condition of the wire. An obvious acceptance or rejection is comparatively easy, but the "grey" area between is difficult to evaluate. The Surveyor must make a sound evaluation and technical judgment based on all available evidence.
- d. In general, the age or time in service of the wire does not directly have a bearing on the acceptance or rejection of the wire other than as a factor to be taken into consideration by the Surveyor when deciding on the extent of survey.

902. Survey and Inspection

100% visual examination and diameter measurements shall be performed. Visual examination shall identify and record the following items for each steel wire anchor line:

- a. The nature and number of wire breaks;
- b. Wire breaks at the termination;

- c. External wear and corrosion;
- d. Localized grouping of wire breaks;
- e. Deformation;
- f. Fracture of strands;
- g. Termination area;
- h. Reduction of rope diameter, including breaking or extrusion of the core.
903. Diameter measurements shall be taken at approximately 100 m intervals, at the discretion of the attending Surveyor. If areas of special interest are found, the survey may be concentrated on these areas and diameter measurements taken at much smaller intervals.
904. An internal examination shall be undertaken as far as practicable if indications of severe internal corrosion or possible breakage of the core or wire breaks in underlying areas. See API RP 2I, Section 2.3.6.3, for guidance on the internal inspection of wire rope.
905. Guidance on Wire Rope Damage
- The cause of wire rope failures may be deduced from the observed damage to the rope. The information summarized below covers most types of wire rope failure. More detailed information, including photographic examples, is available in ISO-Standard 4309 and API RP 2I.
906. Broken wires at the termination indicate high stresses at the termination and may be caused by incorrect fitting of the termination, fatigue, overloading or mishandling during deployment or retrieval.
- Distributed broken wires, illustrated by figures 9 through 12 of API RP 2I may indicate the reason for their failure.
 - Crown breaks or breakage of individual wires at the top of strands may be caused by excessive tension, fatigue, wear or corrosion.
 - Excessive tension is indicated by necking down of the broken end of the wire.
 - Fatigue is indicated by broken faces perpendicular to the axis of the wire.
 - Corrosion and wear may be indicated by reduced cross sections of the wire.
 - Valley breaks, at the interface between two strands indicate tightening of the strands, usually caused by a broken core or internal corrosion which has reduced the diameter of the core.
 - Valley breaks can be caused by high loads, tight sheaves, and sheaves of too small a diameter.
- h. Locally grouped broken wires in a single strand or adjacent strand may be due to local damage. Once begun, this type of damage will usually worsen.
907. Changes in rope diameter can be caused by external wear, inter-wire and inter-strand wear, stretching or corrosion. A localized reduction in rope diameter may indicate a break in the core. Conversely, an increase in rope diameter may indicate a swollen core due to corrosion.
908. Wear on the crown of outer strands in the rope may be caused by rubbing against fairleads, unit structure, or the sea bed depending on the location of the wear. Internal wear between individual strands and wires in the rope is caused by friction and is accelerated by bending of the rope and corrosion.
909. Corrosion decreases rope strength by reducing the cross-sectional area and accelerated fatigue by creating an irregular surface which invites stress cracking. Corrosion is indicated by:
- The diameter of the rope at fairleads will grow smaller;
 - The diameter of stationary ropes may actually grow larger, due to rust under the outer layer of strands. Diameter growth is rare for mooring lines.
910. Deformation, i.e. distortion of the rope from its normal construction, may result in an uneven stress distribution in the rope. Kinking, bending, scrubbing, crushing and flattening are common wire rope deformations. Ropes with slight deformations will not lose significant strength. Severe distortions can accelerate rope deterioration and lead to premature failure.
911. Thermal damage, although rare for mooring ropes in normal service, may be indicated by discoloration. Prompt attention shall be given to damage caused by excessively high or low temperatures. The effect of very low temperatures on wire rope is unclear except for the known detrimental effect on lubricants.

Rgmodm15en-PIT02S2-abcdef-00