

## **RULES FOR**

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# **SURVEY AFTER CONSTRUCTION 2017**

### **NOTICE NO. 1 – July 2017**

The following Rule Changes were approved by the ABS Rules Committee on 30 May 2017 and become **EFFECTIVE AS OF 1 JULY 2017**.

*(See <http://www.eagle.org> for the consolidated version of the 2016 Rules for Survey After Construction (Part 7), with all Notices and Corrigenda incorporated.)*

*Notes - The date indicated in the parentheses in the Rules for Survey After Construction (Part 7) is the date that the requirement becomes effective for vessels undergoing survey on or after this date.*

## **PART 7            RULES FOR SURVEY AFTER CONSTRUCTION**

### **CHAPTER 3       HULL SURVEYS**

#### **SECTION 2       VESSELS FOR UNRESTRICTED SERVICE**

#### **1            Annual Surveys**

##### **1.1        All Vessels**

##### **1.1.2      Protection of Other Openings**

*(Add new Item 7-3-2/1.1.2(j), as follows:)*

*1.1.2(j) (1 July 2017) Closures for sounding tubes and attached securing devices.*

#### **3            Intermediate Surveys (1 July 2014)**

##### **3.19      Chemical Carriers ESP (1 July 2006)**

##### **3.19.3    Overall Survey Requirements**

*3.19.3(a) For Vessels 5 < Age ≤ 10 years (2010)*

*(Revise Subitem 7-3-2/3.19.3(ai), as follows:)*

- i) (1 July 2017) Ballast Tanks. In addition to 7-3-2/3.1.2, representative ballast tanks selected by the Surveyor including fore and aft peak tanks and a number of other tanks, taking into account the total number and types of ballast tanks, are to be examined. If such overall survey reveals no visible structural defects, the examination may be limited to verification that the corrosion prevention system remains effective.*

**PART 7                    RULES FOR SURVEY AFTER CONSTRUCTION**  
**CHAPTER 6            MACHINERY SURVEYS**  
**SECTION 2            SURVEY REQUIREMENTS**

1      Annual Surveys – Machinery (1 July 2012)

1.1    **All Vessels**

1.1.8    Electrical Installation (2002)

*(Add new Item 7-6-2/1.1.8(e), as follows:)*

*1.1.8(e) Harmonic Distortion (1 July 2017).* For vessels fitted with harmonic filters on the main busbar:

- The harmonic distortion levels of the main busbar are to be measured within the annual survey window under seagoing conditions to give a clear representation of the condition of the entire plant to the surveyor.
- The Surveyor is to verify that harmonic distortion logs are being maintained with measured values of harmonic distortion and information regarding what equipment was running at the time.
- In addition to the annual measurement, the harmonic distortion is to be measured following modification of the electrical system or major power consumers.
- For vessels with contract dates after 1 July 2017, the Surveyor is to additionally verify that a continuous monitoring system for harmonic distortion is installed and that the values are being logged electronically or in the engine log book.

**PART 7                    RULES FOR SURVEY AFTER CONSTRUCTION**  
**APPENDIX**  
**SECTION 11            REPAIR AND CLADDING OF SHAFTS**

17      Cladding of Shafts by Welding

*(Revise Paragraph 7-A-11/17.12, as follows:)*

**17.12 Cladding on Taper (1 July 2017)**

If cladding is carried out in way of any part of the taper these additional requirements are applicable:

- i)*      Special precautions are to be taken to avoid generating flaws and voids at the transitions between the straight part of the shaft and the taper.
- ii)*     The cladding is to extend over the entire surface of the taper including the transitions.
- iii)*    An appropriate UT method that is capable of detecting weld flaws and voids is to be performed of the taper and transition region. Process detectability is to be verified and validated.
- iv)*    Four macro-specimens located 90 degrees apart across a taper transition (from the smaller diameter to the taper), can be taken from a test unit, as indicated in 7-A-11/Figure 7. The macro-specimens are to be free from weld flaws and voids.

*(Revise Paragraph 7-A-11/17.15, as follows:)*

**17.15 Final Examination (1 July 2017)**

The entire finish machined area of the cladding is to be examined by dye penetrant and an appropriate UT method.

**PART 7 RULES FOR SURVEY AFTER CONSTRUCTION**

**APPENDIX**

**SECTION 14 SURVEYS BASED ON PREVENTATIVE MAINTENANCE TECHNIQUES**

**1 General**

*(Revise Paragraph 7-A-14/1.1, as follows:)*

**1.1 Survey and Maintenance Intervals (1 July 2017)**

Maintenance is to be carried out on the basis of intervals between overhauls recommended by manufacturers, documented operator's experience and/or results from condition monitoring a program, where applied. In general, the intervals for the Preventative Maintenance Program are not to exceed those specified for Special Continuous Survey of Machinery (CMS). However, for components where the maintenance is based on running hours or number of cycles, longer intervals may be accepted as long as the intervals are based on the manufacturer's recommendations or satisfactory results from a condition monitoring program. In addition, if an approved PMP is in effect, the opening of individual items of equipment may not be required during the CMS cycle, based on satisfactory results within the program.

**1.2 Definitions**

ii) *Preventative Maintenance Program (PMP)*

*(Editorially revise 7-A-14/1.2ii)a, as follows:)*

a) *Planned Maintenance (PM)* – A maintenance plan which uses time-based inspection, part replacement and/or overhauls in an effort to prevent equipment failures. Timing can be based on calendar days, number of cycles, or equipment running hours. Such schedules are generally established by the machinery manufacturer and include lubrication servicing; filter, bearing and seal replacements; as well as major overhaul.

*(Add new 7-A-14/1.2iv) and 7-A-14/1.2v, as follows:)*

v) *Reliability Based Maintenance (RBM) (1 July 2017)* – A process for developing a preventative maintenance plan that will act as the foundation for applying selective reliability techniques, choosing and deploying a maintenance plan, and creating an effective reliability strategy to support an efficient maintenance environment

vi) *Design for Reliability (DFR) (1 July 2017)* – The incorporation of reliability-enhancing strategies and practices into the design, manufacture and capital equipment procurement procedures.

(Revise Paragraph 7-A-14/1.3, as follows:)

**1.3 Optional Notation (1 July 2017)**

Optional notations can be added to the *Record* indicating compliance with the Preventative Maintenance Program on one or more pieces of equipment. See 7-A-14/Table 1, “Program Definitions, Notations and References”, which lists the applicable subsections and paragraphs in the *ABS Guide for Surveys Based on Machinery Reliability and Maintenance Techniques* and this Appendix. Any notation indicates less than 50% of all classed equipment is enrolled into this program. Any notation with “+” appended (e.g., **PMP+**) indicates 50% or greater of the equipment is enrolled.

(Add new 7-A-14/Table 1, as follows:)

**TABLE 1  
Program Definitions, Notations and References (1 July 2017)**

Program	Definition	ABS Notation	Applicable Section of Surveys Based on Preventative Maintenance Techniques (7-A-14/) / MRM Guide					
			ABS Engineering Submittal	Operational Documentation			ABS Surveys	
				Onboard Req	Sustain	Annual Report	Implement	Annual Confirmation
Design for Reliability	Design for reliability (DFR) utilizes reliability/risk analysis tools so that future reliability-related performance meet expectations. It also provides a structure for applying these reliability/ risk analysis tools throughout the design process to provide the information needed by the operator to make more informed design decisions.  <i>** DFR requires the addition of a reliability based or reliability centered maintenance program.</i>	<b>PMP-RBMD</b> or <b>PMP-RBMD+</b>	--- 2/3, 3/3	--- 5/2, 5/3	--- 5/4	--- 5/5	--- 6/1	--- 6/2
		<b>PMP-RCMD</b> or <b>PMP-RCMD+</b>	17.7.1 2/3, 4/3	17.9 5/2, 5/3	--- 5/4	17.7.2 5/5	--- 6/1	9.1 6/2
Reliability Based Maintenance	A maintenance development process that will act as the foundation for applying selective reliability techniques, choosing and deploying a maintenance plan, and creating an effective reliability strategy to support an efficient maintenance environment	<b>PMP-RBM</b> or <b>PMP-RBM+</b>	--- 3/3	--- 5/2, 5/3	--- 5/4	--- 5/5	--- 6/1	9.1 6/2
Reliability Centered Maintenance	A systematic process coupling risk and reliability principles to create a maintenance plan by taking into consideration equipment criticality, functional definitions with applicable failure management analysis, OEM recommendations. To support the resulting maintenance plan, RCM also deploys a risk based analysis of spare parts and a sustainment plan.	<b>PMP-RCM</b> or <b>PMP-RCM+</b>	17.7.1 4/3	17.9 5/2, 5/3	--- 5/4	--- 5/5	17.5 6/1	9.1 6/2

In order to qualify for a notation assigned under the preventative maintenance program requirements, a vessel is required to be assigned with a <b>PMP</b> notation.								
Preventative Maintenance Program (see 7-A-14)	A program that consists of planned maintenance and/or condition-monitoring activities. Maintenance intervals and tasks follow OEM recommendations or documented operator experience.	<b>PMP</b>	13.5.1 (PM), 15.5.1 (CM) 17.7 17.7	13.7 (PM) 15.7 (CM) ---	N/A	13.5.2 (PM) 15.5.2 (CM) ---	13.3 (PM), 15.3 (CM) ---	9.1 ---
Preventative Maintenance Program (see 7-A-14/18)	Condition based maintenance (CBM) evaluates the condition or health of a machine by performing periodic or continuous monitoring	<b>PMP-CBM</b>	18.7.1 ---	18.9.1 ---	N/A	18.7.2 ---	18.5 ---	9.1 ---

### 3 Program Requirements

*(Revise Paragraph 7-A-14/3.3, as follows:)*

#### 3.3 Surveys (1 July 2017)

Surveys related to the vessel are to be up-to-date, without outstanding recommendations which would affect the Preventative Maintenance Program. The machinery in the program is to be on a Special Continuous Survey of Machinery (CMS) cycle.

If the vessel is not on CMS, the Owner is to be advised that the vessel is to be entered in CMS. For machinery for which an outstanding recommendation exists, confirmation is to be made that repairs have been performed, or if repairs have not been performed, the Owner is to be notified that an outstanding recommendation exists.

The **PMP** notation can be applied to a vessel without an **AMS** notation with permanently installed machinery enrolled in either an approved PM, CM, CBM, RBM, RBMD, RCM, or RCMD plan. Vessels without an **AMS** notation will not be required to have the subject machinery on CMS, instead machinery will be credited in conjunction with the vessel’s Special Periodical Survey of Hull (SSH). However, all other requirements of the **PMP** notation are to be complied with, including but not limited to the submission of an annual report to the attending Surveyor, as detailed in 7-A-14/9.3 and maintenance of the required onboard documentation, as detailed in 7-A-14/11.

Any machinery items not covered by the Preventative Maintenance Program are to be surveyed and credited in accordance with Part 7, Chapter 6, “Machinery Surveys” of the *ABS Rules for Survey After Construction (Part 7)*.

### 5 Program Description

*(Revise Paragraph 7-A-14/5.1, as follows:)*

#### 5.1 General (1 July 2017)

To enroll equipment items into Planned Maintenance (PM) [See 7-A-14/13.5.1(a)], a comprehensive plan is to be submitted to the attending ABS Survey Office for review prior to conducting an implementation survey. To enroll equipment items into Condition Monitoring (CM), the documentation required by 7-A-14/15.5.1(a) is to be submitted to the responsible ABS Engineering Office for approval prior to conducting an implementation survey. To enroll equipment items into Condition Based Maintenance (CBM), the documentation required by 7-A-14/18.7.1(a) is to be submitted to the responsible ABS Engineering Office for approval prior to conducting an implementation survey. To enroll equipment items into Reliability Based Maintenance (RBM) or Reliability Centered Maintenance (RCM), the documentation required by 7-A-14/17.7.1(a) is to be submitted to the responsible ABS Engineering Office for approval prior to conducting an implementation survey. Only machinery subject to Special Continuous Survey of Machinery (CMS) is to be included in the program (unless review of any non-essential machinery is specifically requested by the Owner).

*(Revise Paragraph 7-A-14/5.3, as follows:)*

**5.3 Implementation Surveys (1 July 2017)**

Once a plan has been reviewed/approved, an implementation survey is to be carried out by the attending Surveyor prior to program commencement. The requirements for the implementation survey are provided in 7-A-14/13.3 (for PM plans), 7-A-14/15.3 (for CM plans), 7-A-14/17.5 (for RBM/RCM plans), or 7-A-14/18.5 (for CBM plans).

Once this survey is carried out and the implementation found to be in order, a report confirming the implementation of the Planned Maintenance and/or Condition Monitoring plan(s) is to be submitted by the attending ABS Surveyor, and the plan(s) may be put into service.

*(Revise Paragraph 7-A-14/5.5, as follows:)*

**5.5 Machinery Status Indicators (1 July 2017)**

Once the Implementation Survey has been satisfactorily completed, the attending Surveyor shall advise Classification Documentation Center (CDC) that the items covered by a Planned Maintenance plan as per 7-A-14/13.5.1(a)i) are to be shown by a PM indicator, and for the items covered by a Condition Monitoring plan as per 7-A-14/15.5.1(a)i) are to be shown by a CM indicator. When equipment is covered by both PM and CM plans, items covered are to be shown by a PM/CM indicator. The owner is to communicate with the attending Surveyor to ensure that the Survey Manager for a vessel shows the correct indicators for all listed equipment. For items covered by a Condition Based Maintenance plan as per 7-A-14/18.7.1(a)i) are to be shown by a CBM indicator.

*(Revise title of Subsection 7-A-14/9, as follows:)*

**9 Annual Surveys and Reporting – Planned Maintenance and Condition Monitoring**

**9.5 Alternative Electronic Formats**

*(Revise 7-A-14/9.5ii), as follows:)*

- ii) *(1 July 2017)* A summation and results of the annual condition monitoring readings. (For machinery enrolled in a Condition Monitoring Plan)

*(Revise title of Subsection 7-A-14/11, as follows:)*

**11 Onboard Documentation – Planned Maintenance and Condition Monitoring**

**15 Condition Monitoring (CM)**

*(Revise Subsection 7-A-14/15, as follows:)*

*(1 July 2017)* A Condition Monitoring plan, which uses quarterly, semi-annual or annual measurements, is intended to be supplemented with Planned Maintenance activities. The benefit of using condition monitoring is that it will provide additional detail to the current condition of the equipment. This additional information can be used to support the crediting of machinery and satisfying the requirements of Special Continuous Survey of Machinery.

With regards to monitoring measurements, ABS principally allows two methods to be used towards the crediting of the CMS cycle as discussed in 7-A-14/9.1. A summary of the first method involves the Chief Engineer or other trained crewmember(s) collecting overall monitoring data on a quarterly basis and a representative specialist of an ABS Recognized Condition Monitoring Company collecting one set of complete monitoring annually. A summary of the second method, discussed in 7-A-14/15.11, involves complete monitoring being collected semi-annually by a representative specialist of an ABS Recognized Condition Monitoring Company, with no requirement for data collection by the Chief Engineer or crewmembers. For both methods, one set of complete monitoring is required to be taken during the three months prior to the date that the Annual Preventative Maintenance Report is provided to the attending Surveyor.

When equipment is covered by both PM and CM plans (substantiated by a PM/CM indicator), the results of the CM analysis may affect the requirements of the vessel's PM plan. When the CM analysis demonstrates that the equipment is operating satisfactorily, consideration will be given for deferring appropriate PM tasks.

## 15.5 Administrative Requirements

### 15.5.1 CM Plan Submission

#### 15.5.1(a) For Items Covered by a Condition Monitoring Plan

*(Revise 7-A-14/15.5.1(a)vi, as follows:)*

- vi) *Baseline Data (1 July 2017).* Initial or baseline data are to be recorded in the presence of the Surveyor and/or a representative specialist of an ABS Recognized Condition Monitoring Company. *(Note: If vibration is selected as a monitoring type, the baseline are to be compared to the acceptable vibration levels shown in SNAME's T&R Bulletin 3-42 "Guidelines for the Use of Vibration Monitoring for Preventative Maintenance" or other equivalent national or international standards). The Owner is to be notified of all machinery that does not meet acceptance criteria (i.e., machinery with high vibration levels).*

### 15.5.2 Owner's Annual Preventative Maintenance Report Requirements

#### 15.5.2(a) CM Plan Report – Annual

*(Revise 7-A-14/15.5.2(a)ii, as follows:)*

- ii) *(1 July 2017)* Where the crew is taking condition monitoring measurements, then training records for the designated crew members and description of training is to be included. Also, the type of recording device, method of data collection and calibration of the data collector must be provided. The attending Surveyor may request a trained crewmember to demonstrate proficiency in collection and related management of the obtained data.

*(Revise 7-A-14/15.5.2(a)iii, as follows:)*

- iii) *(1 July 2017)* Summary and analysis of machines that failed prior to a scheduled monitoring.

(Revise Subsection 7-A-14/17, as follows:)

## 17 Reliability Based (RBM) or Reliability Centered Maintenance (RCM) (1 July 2017)

### 17.1 Application

The following are procedures and conditions under which a properly conducted Reliability Based Maintenance (RBM) or Reliability Centered Maintenance (RCM) analysis and the resulting Preventative Maintenance Program may be credited as satisfying the requirements of Special Continuous Survey of Machinery.

No preventative maintenance plan supersedes the judgment of an ABS Surveyor, nor does it waive an ABS Surveyor(s) attendance for damage, overhaul of main engines, generator engines, steering gears, general insulation condition and resistance tests, electrical devices functional tests, reduction gear teeth examinations, hydrostatic tests of pressure vessels, tests and verification of safety devices such as relief valves, overspeed trips, emergency shut-offs, low-oil pressure trips, etc., as required by the *ABS Rules for Building and Classing Steel Vessels*, including the *ABS Rules for Survey After Construction (Part 7)*. It is a prerequisite that the machinery in this program be on a Special Continuous Survey of Machinery (CMS) cycle.

### 17.3 General

By using RBM or RCM principles, maintenance is evaluated and applied in a rational manner. Functional failures with the highest risk are identified and then focused on. Equipment items and their failure modes that will cause high-risk functional failures are identified for further analyses. Maintenance tasks and maintenance strategies that will reduce risk to acceptable levels are determined. Spare parts inventories are determined based on the maintenance tasks developed and a risk assessment. An RCM sustainment procedure is instituted to continually monitor and optimize maintenance. Accordingly, improved equipment and system reliability can be expected.

Additional information and explanations on the requirements for the RBM and RCM programs can be found in the *ABS Guide for Surveys Based on Machinery Reliability and Maintenance Techniques*, and the *ABS Guidance Notes on Reliability Centered Maintenance (RCM Guidance Notes)*.

#### 17.3.1 Definitions

A RBM or RCM analysis will generate additional types of maintenance tasks which are not previously defined by the Preventative Maintenance Program. In order to simplify the plan approval process, implementation survey and annual surveys, the following groupings of these tasks will be used to determine the applicable requirements:

- i) Planned Maintenance type-tasks
  - Planned Maintenance Tasks
  - Failure Finding Tasks
  - Other Applicable and Effective Tasks
- ii) Condition Monitoring type-tasks
  - Condition Monitoring Tasks
  - Combinations of Planned Maintenance and Conditioning Monitoring Tasks

#### 17.3.2 Optional Notations

The RBM or RCM Analysis is to be approved by an ABS Engineering Office. Upon completion of a satisfactory Implementation Survey, a “Certificate of Approval for Reliability Based Maintenance Program” or “Certificate of Approval for Reliability Centered Maintenance Program”, as applicable, is to be issued by the attending Surveyor. A notation, if appropriate, will be entered in the *Record*. The Owner may select desired systems or equipment items for which a RBM or RCM analysis will be conducted and will be used to develop a Preventative Maintenance Program. All machinery items covered by the RBM or RCM analysis will be surveyed and credited in accordance with the *ABS Rules for Survey After Construction (Part 7)* and the respective section(s) of the Preventative Maintenance Program.

### 17.3.3 Survey Credit Towards the Current CMS Cycle.

Owners may conduct a RBM or RCM analysis on any item(s) of equipment, but credit will only be given towards periodic surveys when the equipment and associated Preventative Maintenance tasks (as defined in 7-A-14/17.3.1) are in compliance with the applicable requirements stated in 7-A-14/13 and/or 7-A-14/15.

## 17.5 RBM or RCM Implementation Surveys

Owners are to submit a written request to enroll their vessel(s) in the Reliability Based Maintenance Program or Reliability Centered Maintenance (RCM) Program. Plans are to be approved by the responsible ABS Engineering Office. The plan must be approved before an implementation survey can be conducted. To complete the implementation survey, the following items need to be checked:

- i)* The RBM or RCM Program is implemented according to the approved documentation and is adapted to the type and complexity of the components/systems on board.
- ii)* The onboard personnel are familiar with the RBM or RCM Program.
- iii)* The machinery identification method and record keeping procedures are described and implemented.
- iv)* The onboard software must be capable of producing the documentation required for the Annual Confirmation Survey (refer to 7-A-14/9 and 7-A-14/17.7.2) and required onboard documentation is present (7-A-14/11 and 7-A-14/17.9).
- v)* A Spare Parts list is readily available and the crew knows how to find parts using it.
- vi)* A sustainment process is in effect which supports the analysis and future updates.
- vii)* Details and back-up capabilities of the computerized system are to be reviewed.
- viii)* The vessel is able to comply with the requirements of surveys and testing for retention of class.
- ix)* The Survey status for the vessel is to be reviewed by the attending Surveyor. The vessel is to be on Special Continuous Survey of Machinery (CMS). The Surveyor is to ascertain if there are any damages or open outstanding recommendations that would prevent the proposed equipment items from being allowed.
- x)* The attending Surveyor will confirm, during the review, that the plan complies with the submission requirements of 7-A-14/17.7, including verification that machinery parts listed under 7-A-14/13 (or 7-A-14/15 if applicable) are not included. In addition, fire fighting appliances including breathing apparatus, fire extinguishers, fireman's outfits and the international shore connection cannot be included under RBM or RCM.
- xi)* For vessels that are due to be placed in service or have recently been delivered so that little or no scheduled maintenance has been performed, the Surveyor is to verify items *i)*, *iii)*, *iv)*, *v)*, *vi)* are available and the onboard personnel have been trained to implement the RBM or RCM Program, item *ii)*.

## 17.7 Administrative Requirements

### 17.7.1 Items Required for RCM Program Submission

- i)* Define Systems
- ii)* Identify Functions and functional failure
- iii)* Conduct Failure Modes, Effects, and Criticality Analysis
- iv)* Select a failure management strategy
- v)* Develop a Preventative Maintenance Program plan
- vi)* Develop a spare parts holding plan [refer to 7-A-14/17.7.1(a)]
- vii)* Develop a RCM sustainment plan [refer to 7-A-14/17.7.1(b)]
- viii)* Document and submit the analysis and plans.
- ix)* A reference list showing owner's equipment item name and ABS equivalent equipment name as shown in ABS Survey Manager.

*17.7.1(a) Spare Parts Holding Documentation.* The spare parts holding documentation is to be a summary with the information indicated in Appendix 1, Table 11 of the *ABS Guide for Surveys Based on Machinery Reliability and Maintenance Techniques*. For the proposed maintenance schedules to be viable, it is essential that the spares that support the identified maintenance tasks are available at the appropriate time. The spares holding requirement is to be developed based on parts necessary to perform tasks to correct each failure mode identified in the reliability analysis as follows:

- i) Parts necessary to perform tasks to correct each failure mode identified in the reliability analysis.
- ii) Parts required as a result of remedial work to correct “condition monitoring”, “planned maintenance”, “failure finding”, “any applicable and effective” and “run-to-failure” tasks.
- iii) An evaluation of the effects on the functional group or system’s operational availability if an out-of-stock condition occurs.
- iv) Assessment for those parts whose use can be preplanned. For those parts whose use cannot be preplanned, determine the quantity necessary to achieve the desired operational availability.
- v) Lead time required for ordering a part out of stock

*17.7.1(b) Sustainment Activities.* Records of sustainment activities are to be available for the ABS Surveyor and a summary included in the annual report. The results of relative ranking analyses, trend analyses, maintenance requirements document reviews, task packaging reviews, age exploration tasks and failure investigations of all unscheduled maintenance and/or breakdowns are to be provided. Sustainment activities can be conducted ashore as long as some shipboard personnel, who have been participating in the RCM program aboard the subject vessel or marine structure, are involved in the sustainment activities.

#### 17.7.2 Owner’s Annual RCM Program Report Requirements

The annual report is to be submitted in a paper or electronic format. Prior to submitting electronic reports, the submitter is to confirm the attending Surveyor has the necessary software to review the reports.

*17.7.2(a) Equipment Item Changes.* If the machinery included in the Program has changed, this is to be stated. Any machinery to be added to the system is subject to the requirements of the Program and approval by the responsible ABS Engineering Office and the attending Surveyor. Also, the asset’s Owner is to advise Corporate Document Classification and the attending Surveyor of any machinery to be deleted from the Program

*17.7.2(b) Maintenance Plan Changes.* If during the sustainment process the time intervals for maintenance task needs to be altered, then documentation that supports the change in interval are to be submitted to the attending Surveyor for review and acknowledgement.

*17.7.2(c) Maintenance Plan Details.*

- i) *Condition Monitoring Tasks:* See 7-A-14/15.5.2
- ii) *Planned Maintenance Tasks:* See 7-A-14/13.5.2

*17.7.2(d) Sustainment Activities.* Records of sustainment activities are to be available for the ABS Surveyor and a summary included in the annual report. The results of relative ranking analyses, trend analyses, maintenance requirements document reviews, task packaging reviews, age exploration tasks and failure investigations of all unscheduled maintenance and/or breakdowns are to be provided. Sustainment activities can be conducted ashore as long as some shipboard personnel, who have been participating in the RCM program aboard the subject vessel or marine structure, are involved in the sustainment activities.

*17.7.2(e) Report Exceptions.* The Owner is to advise the attending Surveyor of all machinery for which maintenance is not indicated, is incomplete, or when additional monitoring is needed for machinery with vibration readings above those in the approved baseline. If either of the above mentioned situations occurs, the condition of the machinery is to be to the satisfaction of the attending Surveyor.

#### 17.7.3 Shore Office Sustainment Program Audit

A sustainment shore office audit is to be completed within five years after the date of enrollment of an asset in RBM or RCM programs or after the crediting date of the previous sustainment audit. This may occur in conjunction with Intermediate and/or Special Survey requirements and is to comply with 6/2.2 of the *ABS Guide for Surveys Based on Machinery Reliability and Maintenance Techniques*.

### 17.9 Onboard Documentation

The vessel's Chief Engineer shall be the responsible person onboard, and in charge of the Reliability Centered Maintenance Program. If a computerized system is used for updating the maintenance documentation and maintenance program, access is to be permitted only by the Chief Engineer or other authorized persons. The following information is to be available onboard.

- i) The latest up-to-date information required in 7-A-14/15.5.1(a).
- ii) For vessels with onboard vibration meters or FFT vibration analyzers, manuals supplied by manufacturers for use of data collectors and computer programs, as well as guidance for machine operating and diagnosis of machine faults.
- iii) Condition monitoring data, including all data since last opening of the machine and the original baseline data.
- iv) Reference documentation (trend investigation procedures, etc.).
- v) Records of lube oil analysis, rotor positioning readings, and interstage bleed system pressures are to be recorded by the vessel's personnel at least on a quarterly basis and retained onboard for review annually by the attending Surveyor.
- vi) Complete vibration data, as specified in 7-A-14/15.5.1(a), are to be taken at least quarterly, or more frequently when warranted by abnormal conditions and operational parameters, and to be reviewed by a representative specialist of an ABS Recognized Condition Monitoring Company and retained onboard for review annually by the attending Surveyor.
- vii) If the vessel includes internal combustion engines in the program, the data outlined in 7-A-14/15.9.2 must be retained onboard for review annually by the attending Surveyor.
- viii) Calibration date of equipment. Calibration is to be in accordance with the manufacturer's recommendations or annually, if not otherwise specified.
- ix) Any repairs or changes to any machines must be reported, and a summation and analysis of all unscheduled maintenance and/or breakdowns of monitored equipment.
- x) All records showing compliance with the program, including a copy of the most recent Owner's annual report are to be made available for review by the Surveyor at the Annual Survey of Machinery.
- xi) Crew training records of the designated members, where crew is taking periodic vibration readings.
- xii) Records for required spare parts, inventory and ordering procedures to procure additional spare parts are to be readily available.
- xiii) Records of sustainment activities are to be readily available, refer to 7-A-14/17.7.1(b).
- xiv) A copy of the approved RCM Plan and ABS approval letter
- xv) A user's manual for the Computerized Maintenance Management System

18 Condition Based Maintenance (CBM) (2017)

*(Revise Paragraph 7-A-14/18.3, as follows:)*

**18.3 Optional Notation (1 July 2017)**

An optional notation can be added to the *Record* indicating compliance with this program. The **PMP-CBM** notation indicates compliance with the **Condition Based Maintenance** on one or more pieces of equipment, A **CBM** indicator will also be placed in the Survey Manager Parts List to indicate the specific equipment enrolled in this program.

**18.5 CBM Implementation Surveys**

*(Revise Item 7-A-14/18.5ii), as follows:)*

- ii) *(1 July 2017)* The onboard personnel are familiar with the CBM Program

*(Revise first paragraph of Paragraph 7-A-14/18.11, as follows:)*

**18.11 Acceptable Groupings of Condition Monitoring Techniques**

*(1 July 2017)* For critical equipment, Condition Based Maintenance is normally accomplished through the use of a combination of Condition Monitoring techniques. The intent of using multiple Condition Monitoring techniques is to provide detection and prediction of the failure modes associated with that piece of equipment. The subparagraphs below are used to define a recommended grouping of techniques for specific types of critical equipment. For all equipment enrolled, it is incumbent upon the owner to propose a satisfactory grouping of techniques as described in 7-A-14/18.11.4.

18.11.4 For all other Equipment

*(Revise Item 7-A-14/18.11.4iii), as follows:)*

- iii) *(1 July 2017)* Provide basis for monitoring intervals. Intervals may be real-time or periodic. Owner is to provide justification for schedule of data collection. Additional information on determining condition-monitoring task intervals is available in Subsection 3/5 of the *ABS Guidance Notes on Equipment Condition Monitoring Techniques*.