



GUIDANCE NOTES

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China Classification Society

# Guidelines for the Implementation of Continuous Machinery Survey (CMS)

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## Explanatory Notes on Compilation

The compilation of the *Guidelines for the Implementation of Continuous Machinery Survey (CMS)* is to aim to provide Shipping Companies, Chief Engineers of ships and Surveyors of CCS with technical supports in terms of establishment, implementation and operation of the Continuous Machinery Survey System, and upgrade the capability of shipping companies in implementing the CMS System, ensuring that effective cooperation from the shipping companies will be provided to the surveyors during the process of surveys, thus to enable a balanced link and a seamless dovetail between the CMS efforts carried out by the chief engineers on-board and the surveyors' surveying efforts to ensure the quality of surveys and meet the corresponding technical requirements under the *Rules for Classification of Sea-going Steel Ships* of CCS on granting the class notation of "CMS".

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# Chapter 1 General Provisions

## 1. General Provisions

### 1.1 Purpose

1.1.1 The *Guidelines for the Implementation of Continuous Machinery Survey (CMS)* is aimed to be used as a Guidance Note for surveyors of China Classification Society (hereinafter referred to as "the Society"), ship owners or ship management companies (hereinafter referred to as "Shipping Company") and chief engineers on-board when carrying out Continuous Machinery Surveys (hereinafter referred to as "CMS"). The purpose of the Guidelines is only to outline the provisions for the implementation of CMS and its operation procedures, which cannot be considered as a substitution for the *Rules for Classification of Sea-going Steel Ships*.

### 1.2 Scope of Application

1.2.1 The Guidelines applies to ships that apply for CMS or have already been assigned with the "CMS" machinery notation.

1.2.2 At the request of the Shipping Company and upon approval by the Society, CMS may be undertaken as a substitution for the special survey of machinery (including electrical installations) and refrigerated cargo installations. The special survey of inert gas system installations may also be carried out in the way of CMS at the request of the Shipping Company if approved by the Society.

1.2.3 As a substitutive method for the special survey of machinery, the adoption of CMS system may not cancel or change other survey items necessary for maintaining its class (such as annual survey, intermediate survey, docking survey, surveys of propeller shaft and stern tube shaft, boiler survey and steam pipe survey, etc.), and other items not included in the survey items of CMS are still needed to be surveyed in accordance with the provisions in Chapter 5 "Survey after Construction" of Part 1 under the *Rules for Classification of Sea-going Steel Ships* of the Society.

### 1.3 Basis for Implementing Continuous Machinery Survey

1.3.1 The current *Rules for Classification of Sea-going Steel Ships* published by the Society.

1.3.2 *Guidelines for the Implementation of Continuous Machinery Survey (CMS)*.

### 1.4 Definitions and Explanations of Continuous Machinery Survey

1.4.1 As a substitutive method for the special survey of machinery, CMS is to evenly distribute all survey and test items to be surveyed at the special survey of machinery (including electrical installations) and refrigerated cargo installations into annual surveys within the (5-year) cycle of the special survey as far as practicable, and the longest interval for each item of continuous survey shall not exceed 5 years.

1.4.2 Surveyor witness survey and confirmatory survey:

- 1) **Witness survey** refers to the survey of CMS items carried out with the attendance of the Society's surveyor.
- 2) **Confirmatory survey** refers to such kind of survey that, for CMS items permissible for the Chief Engineer's inspection, the Society's surveyor may credit the completed inspections of relevant survey items of CMS by reviewing and verifying the *Chief Engineer's Report for Continuous Machinery Survey* (Form PC/CE) and work records submitted by the Chief Engineer.

1.4.3 Methods used by surveyors at witness surveys of CMS items:

- 1) **Survey method 1**:- to carry out full open-up surveys and/or partial open-up surveys, if accepted by the surveyor of the CMS items, as well as related function tests and/or hydraulic pressure test (including hydraulic pressure test when the surveyor deems necessary).
- 2) **Survey method 2**:- to perform function tests of the CMS items.
- 3) **Survey method 3**:- to perform measurement and/or adjusting of the CMS items.

When conducting a CMS survey, refer to Annex I for all applicable survey methods to different CMS items.

1.4.4 How to understand the continuous survey

- 1) During the process of operating a ship, the crew will keep performing maintenance of the ship continuously. The implementation of continuous survey of machinery is aimed to combine the maintenance of a ship carried out by its crew with the special surveys of machinery (including electrical installations) and refrigerated cargo installations stipulated by the Society. To this end, the Society has put all survey items of the special surveys of ship's machinery (including electrical installations) and refrigerated cargo installations into detailed categories, which, in combination with the practical situations such as ship repairs, self-repair by the crew, and etc., shall be inspected by the Shipping Company as a substitution for the special survey via an even distribution of all the survey items within the cycle of the special survey as far as practicable. In this way, the laid-up time for survey will be greatly shortened, and the operational efficiency of ships will be improved.
- 2) In order to successfully implement the CMS, the Shipping Company needs to develop a continuous and systematically planned Continuous Machinery Survey plan (hereinafter referred to as CMS plan), and the attending surveyor shall confirm and/or witness a part of the machinery (including electrical installations) and refrigerated cargo installations opened up for survey on board to grasp the general condition of the whole machinery and equipment of the ship. But only when the implementing status of each survey item of CMS is accurately provided by the Shipping Company to the attending surveyor shall this objective be achieved.
- 3) At CMS surveys, where any of the survey items of the machinery (including electrical installations) and refrigerated cargo installations has been inspected in open-up condition without witness of the attending surveyor, such inspection shall be credited in combination with the maintenance and repair cycle and according to similar open-up inspections of the machinery (including electrical installations) and refrigerated cargo installations, together with the results of systematic inspection records.  
For survey items of machinery (including electrical installations) and refrigerated cargo installations inspected in open-up condition without witness of the attending surveyor, the Shipping Company or the ship shall take measures to ensure that the CMS plan is in a position to avoid any possible damage that may occur to the machinery and equipment in the future, thus to coordinate the actual maintenance work of the ship with the least possible interference to the maintenance and repair cycle.

For example:

- a. If there are 2 or more of the same machinery and equipment, the open-up inspections shall be scheduled in rotation as far as possible to avoid inspection at the same period of time.
- b. If deficiencies are found in machinery installations or components opened up for CMS inspection, the attending surveyor may require opened-up survey of similar machinery (including electrical installations) and refrigerated cargo installations or

their components.

## **1.5 Procedure Requirements**

### **1.5.1 Application for survey subject to assigning CMS notation**

- 1) Where a ship is to apply for CMS machinery notation, the Shipping Company shall submit an *Application for Survey* to the survey unit.
- 2) It is recommended to apply for the CMS survey prior to the operation of a newbuilding ship or upon completion of the special survey of machinery.
- 3) For ships operating between two special surveys, with transfer of class into CCS from societies accepted by CCS as well as that survey of the Machinery Planned Maintenance System (PMS) had been carried out in last cycle, applications may also be acceptable; reference can be made to Chapter 2, Section 2.3.5 of the Guidelines for detailed instructions.

### **1.5.2 Review of survey subject to assigning CMS notation**

Upon receipt of the application, a review of the survey will be made by the survey unit.

### **1.5.3 Documents to be submitted for survey subject to assigning CMS notation**

- 1) CMS plan, related plans shall be prepared by the Shipping Company. When necessary, consult the attending surveyor who is going to carry out the survey.
- 2) Ship's general arrangement plan
- 3) Engine room arrangement plan
- 4) Particulars of machinery and electrical installations
- 5) Alteration or addition of ship's machinery and electrical installations(if any)

### **1.5.4 Development and approval of CMS Plan**

Please refer to Chapter 2 of the Guidelines for detailed requirements on relevant development and approval of the CMS plan.

### **1.5.5 Assignment of the class notation "CMS"**

- 1) Upon approval of the CMS plan and satisfactory completion of site verification, the survey unit of the Society shall issue an Interim Certificate of Classification to the applicant ship, recommending it to be assigned with the CMS notation by the Headquarters, with a Survey Report issued to explain at the same time. The Headquarters of the Society will renew the Full-term Certificate of Classification based on Interim Certificate of Classification.
- 2) Where ships have undergone Machinery PMS survey in the previous cycle, upon approval of the CMS plan and satisfactory completion of site verification, the survey unit shall renew the Interim Certificate of Classification, recommending the CMS notation to be assigned by the Headquarters while canceling the PMS notation, with a Survey Report to be issued to explain.

### **1.5.6 Implementation of CMS**

Where a ship is to apply for the survey of CMS items, the Shipping Company shall submit an *Application for Survey* to the survey unit.

Upon receipt of the application, a review of the application will be made by the survey unit. Please refer to Chapter 3 of the Guidelines for detailed requirements on implementing the survey of CMS.

### **1.5.7 Suspension of Class**

According to relevant provisions of the current *Rules for Classification of Sea-going Steel Ships* of the Society, the class will be suspended if any continuous survey items due or overdue at the time of annual survey has not been dealt with and no extension is granted by CCS.

#### 1.5.8 Withdrawal of Class

According to relevant provisions of the current *Rules for Classification of Sea-going Steel Ships* of the Society, the class will be withdrawn if class has been suspended for a period of six (6) months due to overdue surveys after construction.

1.5.9 For the first cycle of the continuous survey, as the due date is the planned survey date, the class will not be affected if the continuous survey items have not been inspected against the survey plan by the annual or intermediate survey; however, all the items must be dealt with by the end of the cycle of the special survey of hull, i.e. upon completion of the survey of continuous survey items, and all unfinished survey items must be completed at this time, otherwise will be considered as CMS completion survey not completed.

In case of the above-mentioned circumstances where the CMS items cannot be completed by the due date, the Ship's owner should submit an application for adjustment of the planned survey date to the survey unit of the Society, but in no case shall the survey date be scheduled outside of this CMS cycle.

#### 1.5.10 Termination and withdrawal of CMS

1) In accordance with the implementation status of CMS, the Society or the Shipping Company may terminate the continuous survey and adopt special survey of machinery instead.

a. Last cycle was a CMS or Machinery PMS survey cycle:

※ Where the termination of CMS occurs at the end of the cycle:

A full scope of special survey of the machinery should be carried out in combination with the completion survey of the special survey of hull; however, in cases where the survey items of CMS and the five-year survey items of Machinery PMS have been completed, the special survey items may be considered as completed which do not require any further survey if the survey dates are within fifteen months before commencement of this survey.

※ Where the termination of CMS occurs during the cycle:

First of all, confirmation should be made that the due continuous survey items have all been inspected satisfactorily and the unfinished continuous survey items beyond the last 15 months of this cycle still need to be completed. The due date of the special survey of machinery is the same as that of the special survey of hull, by which all special survey items must be completed.

※ It is recommended to apply for termination of CMS in combination with the completion survey of the hull special survey.

b. Last cycle was a special survey cycle or the first special survey cycle for a newbuilding ship:

The Shipping Company may, at any time during this cycle, choose to terminate CMS and reinstate the special survey. When the items of special survey are due, a full scope of special survey should be carried out; however, in cases where the survey items of CMS have been completed, the special survey items may be considered as completed, which do not require any further survey, if the survey dates are within fifteen months before commencement of the special survey of machinery.

2) In accordance with the implementation status of CMS, the Shipping Company may apply for termination of the continuous survey and adopt Machinery PMS instead.

a. For ships that are operating under CMS system, if the Machinery PMS survey plan can be developed in a reasonable manner, the original continuous survey items will then be credited. PMS survey items should completely cover all continuous survey items, and ensure that the interval between the completion date of the original continuous survey items and the next maintenance date shall not exceed the PMS

survey interval.

- b. For detailed survey requirements on ships' Machinery PMS, please refer to Annex 16 *Guideline for Survey of Planned Maintenance Scheme(PMS) for Machinery* under Chapter 5, Part 1 of the Society's *Rules for Classification of Sea-going Steel Ships*.
  - 3) For a Chinese flag ship, if special periodical survey is adopted, the CMS notation should be withdrawn, that is, to terminate the CMS.
  - 4) Where the CMS survey results of ships are found not compliant with relevant requirements, the survey unit of the Society shall report to the Headquarters which will give written warnings to the Shipping Company, as appropriate, requesting for correction within a given period of time; if not corrected, the survey unit may terminate the CMS system and withdraw the CMS notation, in which case the survey shall be carried out according to the requirements under this Section 1.5.10.1.
  - 5) Reporting after termination and withdrawal of CMS  
In response to the above-mentioned circumstances, the CMS system may be terminated upon completion of the required survey, and the survey unit shall issue an Interim Certificate of Classification to the ship and withdraw the CMS notation. For circumstances provided in Section 1.5.10.2), the PMS notation should also be added to the Interim Certificate of Classification. Meanwhile, a Survey Report shall be issued to explain why this is happening. The Headquarters of the Society will renew the Full-term Certificate of Classification based on Interim Certificate of Classification.
- 1.5.11 In order to maintain the class, the ship may be laid up; for relevant CMS survey requirements, please refer to the Society's *Guidelines for Lay-up of Ships*.

## Chapter 2 Development and Approval of CMS Plan

### 2. Development and Approval of CMS Plan

#### 2.1 General requirements

##### 2.1.1 Documents and files

Documents and files shall be collected in accordance with the requirements under section 1.5.3 of the Guidelines.

##### 2.1.2 Determination of CMS items

The CMS system is applicable to general types of machinery and equipment, which may be determined according to scope of the special surveys under Part 1, Chapter 5, sections 5.9.4 and 5.10.4, and Chapter 6, section 6.6.4 of the Society's *Rules for Classification of Sea-going Steel Ships*.

##### 2.1.3 Survey cycle of CMS

All survey items should be completed within the rotation cycle of a (five-year) special survey cycle.

#### 2.2 List of CMS items

See "*Annex I List of CMS Items and Methods of Witness Survey*" for details.

##### 2.2.1 CMS items permissible for the Chief Engineer's inspection by the Society

###### 1) Diesel engine of main propulsion system

Including M/E cylinder cover and its attachments, M/E cylinder liner, M/E pistons, piston rod, piston pin and its bearing, M/E crosshead, crosshead bearing, guide, M/E connecting rod, crank web deflection measurement, bedplate, crankcase, engine frame, M/E governor, crankcase door fastening and explosion-proof release device, scavenging box safety release device, M/E high-pressure fuel pump, fuel boost pump, electric spray system, scavenging pump or scavenging fan, turbocharger, air cooler, M/E vibration damper and balance device, M/E camshaft and their transmitting gear, M/E reversing gear, M/E-driven bilge pump/lubricating oil pump/cooling water pump, M/E lubricating oil and fresh water cooler, M/E foundation bolts and gaskets, M/E starting air pipes and valves.

###### 2) Electric propulsion installations

Including propulsion motors, the prime mover of propulsion generator, propulsion generator, propulsion motor running test.

###### 3) Power transmission system and shafting

Including thrust shaft and its bearings, intermediate shaft and its bearings, foundation bolts and gaskets for the bearing seats of gearboxes/thrust shaft/intermediate shaft.

###### 4) Auxiliary engines

Including auxiliary diesel engines for generator and associated pumps driven by them (main/berthing/emergency), auxiliary diesel engines for important auxiliary machinery installations, foundation bolts and gaskets for auxiliary engines.

###### 5) Auxiliary machinery

###### a. Air compressors

Including main, auxiliary, control and emergency air compressors.

- b. Independently driven pumps and their motors and starters  
Including sea water cooling pump, fresh water cooling pump, fuel oil pump, lubricating oil pump, oil purifier, feed pump, condensate pumps, thermal oil pump, bilge pump, ballast pump, fire pump.
- c. Heat exchanger  
Including condenser, feed water heater, cooler, oil heater.
- d. Main boiler fresh water generator for driving the main steam turbine.
- e. Electrical installations  
Including all generators, insulation resistance (electric equipment and the circuit), equipment within dangerous zones, main switchboard, emergency switchboard, distribution boards and their attachments, all cables, wet-type transformer for essential power supply, emergency power source together with its automatic device and auxiliary power source, including uninterrupted power supply (UPS) for automation system, emergency lighting, temporary emergency lighting, supplementary emergency lighting, cables for electric propulsion units, as well as frequency converter/transformer/all subsidiary equipment and control units and insulation resistance measurement, navigation light, general alarm, public address system, fire detection system, engineer's alarm system, bilge water detection system.
- f. Deck machinery  
Including steering gear and its oil pumps and motors, anchor windlass and machinery (including its hydraulic pump), mooring winch (including its hydraulic pump), hydraulic motors driving cargo pumps.
- g. Forced and draught fans at engine room and cargo holds.
- h. Cargo pump installations  
Including cargo oil pump (including chemicals and liquid gas cargo pumps), stripping pumps, tank washing pumps, tank washing water heaters, drain condensers.
- i. Piping, valves and accessories  
Including compressed air piping, fuel oil piping, lubricating oil piping, seawater cooling piping, freshwater cooling piping, feed water piping, engine room steam & condensate piping, thermal oil piping, engine room bilge water piping, engine room ballast water piping, engine room hydraulic piping, and their valves, cocks and filters, as well as remote control valves, collision bulkhead valves, and pressure/vacuum valves.
- j. Refrigerated cargo installations  
Including reciprocating refrigeration compressors, rotary screw compressors, condenser cooling pump, refrigerant circulation pumps, brine circulating pumps, refrigerant condensers, refrigerant evaporators, refrigeration test and thermal resistance test of the refrigerated cargo systems. Please note that, at least one of the refrigeration compressors for the refrigerated cargo installations should be inspected with the attendance of the Society's surveyor.
- k. For liquefied gas tankers  
Including reciprocating refrigeration compressors, reciprocating cargo gas compressors, condenser cooling pump, cargo circulating pump (if any).
- l. Approved inert gas system  
Includes inert gas piping system, fuel oil type inert gas generator, scrubber, inert gas distribution pipe/check valves and soot blower interlock device, inert gas fan, deck water seal and the second non-return device, pressure vacuum breakers, cooling water

system including overboard discharge pipes and valves of outflow pipes and scrubber, all automatic closing devices and alarms.

m. Additional requirements for ships with machinery automation notation

Include automated system of the main propulsion machinery, local control station, engine room centralized control station, bridge control station, M/E oil mist detector, automated systems of boiler (including thermal oil boilers), automated control and alarms of other important machinery and equipment, maneuvering tests of sea water suction valve and discharge valve below waterline.

n. Separate fuel tanks (not as part of the hull structure).

6) Other items the Society considers necessary to be covered under the CMS system

2.2.2 CMS items that must be inspected with the attendance with the Society's surveyor

These items will be marked as "S" in the Society's survey status.

- 1) Crankshaft of the main propulsion diesel engine and its bearing (main bearing and bottom end (crankpin) bearing).
- 2) Main steam turbine (full set).
- 3) Main gas turbine (full set).
- 4) Gearbox, shafting flexible coupling and clutches.
- 5) Steam turbine that drives generator and auxiliary equipment and its components.
- 6) Generator operating test under load and governor test, generator parallel operating test, automatic control and alarms of the generation system and power plant, air circuit breaker of generator.
- 7) Test of M/E operation and initial starting arrangement.
- 8) Air vessels (applicable to air vessels with a working pressure at 0.7 MPa and above). Including main air vessel, auxiliary air vessel, control air vessel, emergency air vessel.
- 9) At least one of the refrigeration compressors for the refrigerated cargo installations.
- 10) Damage, repair and alteration of machinery installations.

2.2.3 Items that are not included in the scope of CMS survey

For example:

- 1) Propeller shaft and its bearing, stern tube shaft and its bearing, directional propeller device, water jet propulsion unit, and etc.;
- 2) Propeller (full set);
- 3) Docking survey (Although seawater inlet valves, ship-side valves and their associated piping and components are also included in the scope of the Society's special survey of machinery, they are usually inspected along with the docking survey, and therefore are not scheduled under the CMS survey);

Boilers and their burners are to be inspected in the boiler survey and steam pipes are to be inspected in the steam pipe survey, and etc. in accordance with the provisions in Chapter 5 "Survey after Construction" of Part 1 under the *Rules for Classification of Sea-going Steel Ships* of the Society.

### 2.3 Key Points for Surveyors in Approving CMS Plan

Relevant key points should also be taken into full account by the Shipping Company in developing CMS plan.

2.3.1 The following equipment should be scheduled for survey in the dock, as far as possible, during the intermediate survey or special survey.

- 1) For main propulsion diesel engine:
    - Survey items such as crankshaft, main bearing, bottom end (crankpin) bearing, and etc.;
    - For medium-high speed main propulsion engine of a small ship, if it is not suitable for open up inspection by part, it is recommended to schedule the inspection at a special survey;
    - Main engine test.
  - 2) Main gas turbine;
  - 3) Main steam turbine;
  - 4) Gearbox, shafting flexible coupling and clutches;
  - 5) Steam turbine that drives generator and auxiliary equipment and its components;
  - 6) Air circuit breaker of the generators;
  - 7) Equipment at dangerous zones;
  - 8) At least one cargo refrigeration compressor;
  - 9) Refrigeration test and thermal resistance test of the refrigerated cargo installations.
- 2.3.2 Recommendations are given as follows for open up survey schedule by numbers of generators of the same type:
- 1) Two sets: one set scheduled during the period of the special survey; the other set scheduled during the period of the third anniversary of the special survey cycle (at annual/intermediate survey);
  - 2) Three sets: one set scheduled during the period of the special survey; one set scheduled during the period of the second anniversary of the special survey cycle (at annual/intermediate survey); the third set scheduled during the third anniversary of the special survey cycle (at annual/intermediate survey);
  - 3) Four sets: one set scheduled during the period of the special survey; one set scheduled during the period of the first anniversary of the special survey cycle (at annual survey); one set scheduled during the period of the second anniversary of the special survey cycle (at annual/intermediate survey); the fourth set scheduled during the period of the third anniversary of the special survey cycle (at annual/intermediate survey);
  - 4) The above-mentioned schedules are only requirements for CMS items, and it is still necessary for the Shipping Company to carry out internal inspections on engine cylinder liner, cylinder head combustion chamber sides, pistons, crank web deflection measurement and crankshaft bearing parts and etc. according to the maintenance and repair requirements as provided in the engine instructions.
- 2.3.3 The survey schedule of intermediate shafts, thrust shafts and their bearings, propulsion motors located below the waterline, and etc. should be scheduled as consistent with the survey cycle of propeller shafts and stern tube shafts as possible.
- 2.3.4 The survey items of CMS shall be evenly distributed into annual surveys within the (5-year) cycle of the special survey as far as practicable.
- 2.3.5 According to the actual operational state of the ship, attention should be given to the following requirements and details:
- 1) Newbuilding ships and operational ships that have implemented CMS system
    - a. The Shipping Company may develop CMS plan based on the aforesaid principles and in combination with the company's maintenance procedures.
    - b. In the first CMS cycle, the due date of all CMS items may also be scheduled at the maturity date of the Certificate of Classification, following which the Shipping Company may schedule the CMS plan of the first continuous survey cycle according to the actual maintenance demands during the operation of the ship at its own discretion, provided that the requirements of sections 2.3.1 to 2.3.4 have been taken into account.
  - 2) Operational ships that start implementation of CMS system between two special surveys  
The survey items of CMS shall be scheduled in a reasonable manner, ensuring that all items required by the special survey are completed in the remaining period of this cycle.
  - 3) Operational ships with transfer of class into CCS from societies accepted by CCS
    - a. Where the ship has adopted CMS for machinery (including electrical installations) and refrigerated cargo installations at the previous classification society, then after transfer

into CCS class, the Shipping Company may continue to implement the CMS system based on the original survey cycle. The CMS plan will be developed according to the due dates of all survey items at the previous classification society, and items already surveyed by the previous classification society are acceptable to the Society. The surveyor is to confirm whether the survey items cover all special survey scopes (including relevant requirements on notations); where items are not covered (items required by the special survey of the Society, but not listed in the list of survey items of the previous classification society), they should be scheduled to be completed before the end of this cycle after consultation with the Shipping Company.

- b. Where the ship has not adopted CMS for machinery (including electrical installations) and refrigerated cargo installations at the previous classification society, the Shipping Company may also apply for CMS according to the requirements of the Guidelines.
  - c. Where the previous classification society has substituted special survey with CMS and the Shipping Company applies for termination of CMS, such application should be proceeded according to provisions on the termination and withdrawal of CMS under section 1.5.10 of the Guidelines.
- 4) Operational ships that implemented machinery PMS survey in the previous cycle  
The survey unit shall verify all PMS survey items in accordance with the PMS plan and each historic PMS survey reports (within one PMS survey interval), confirming that all due PMS survey items have been inspected before direct reinstatement of the CMS system, for which the attending surveyor shall develop the CMS plan in combination with the completion dates of the survey items within the five-year PMS cycle. Withdrawal of relevant PMS notation shall be in compliance with the requirements of *Guidance for Ships' Machinery Planned Maintenance System (PMS)*.

#### **2.4 Initial development of CMS plan**

The Shipping Company is responsible for the development of CMS plan, and if necessary, the site surveyor who is going to carry out the survey may be consulted.

- 2.4.1 The responsible surveyor of the survey unit shall, in combination with the actual configuration of the ship's machinery (including electrical installations) and refrigerated cargo installations, export a sample CMS plan (Form PLAN/CMS) attached with a list of CMS items from the Ship Survey Information Management System, and pass to the Shipping Company.
- 2.4.2 The Shipping Company shall, according to the principles under sections 2.1 to 2.3 of this Chapter and in combination with the company's own maintenance procedures, verify the integrity and accuracy of the ship's machinery (including electrical installations) and refrigerated cargo installations and their components listed in the list of survey items attached to the CMS plan (Form PLAN/CMS), and schedule the timing for open up survey of the machinery (including electrical installations) and refrigerated cargo installations and their components. Relevant templates shall be submitted, upon completion, to the responsible surveyor of the survey unit for approval.

#### **2.5 Approval of CMS plan**

- 2.5.1 According to the principles set out under sections 2.1 to 2.3 of this Chapter, the responsible surveyor of the survey unit shall be responsible for the approval of CMS plan, and upon completion of site verification to the surveyor's satisfaction, the surveyor may input the entire contents of the CMS plan (Form PLAN/CMS) into the Society's Ship Survey Information Management System to generate an official copy of the CMS plan (Form PLAN/CMS), which must be issued by the responsible surveyor.
- 2.5.2 When inputting the CMS plan (Form PLAN/CMS) into the Society's Ship Survey Information

Management System, CMS items not permissible for the Chief Engineer's inspection should be marked as "S".

- 2.5.3 CMS plan (Form PLAN/CMS) that is developed initially shall not be replaced along with the completion survey of CMS, and the surveyor needs not to sign off each CMS survey item inspected by him/her either, as it is only used as the basis for initialization of CMS plan in the Society's Ship Survey Information Management System and reference for subsequent surveys.
- 2.5.4 Where CMS plan (Form PLAN/CMS) is developed initially, one copy shall be kept on board, and one copy shall be kept at the survey unit for archiving.

## Chapter 3 Implementation of CMS

### 3 Implementation of CMS

#### 3.1 General Requirements

3.1.1 The interval of each survey of all CMS items shall not exceed 5 years. The Shipping Company and the ship's Chief Engineer shall schedule the overhaul in a reasonable manner, and complete the inspection of CMS items on time. All CMS items shall be inspected in the condition as in a special survey, that is, to inspect in open up and clean condition. For control, alarm and security systems, function tests may usually be carried out in a simulation method.

3.1.2 Before implementing the CMS survey, both the chief engineer of the ship and the surveyor of the Society should check the latest survey status, and verify the survey items of this CMS survey.

3.1.3 All due or overdue continuous survey items should be completed at the annual survey. When scheduling the ship's annual survey, such circumstances that CMS items which should be inspected on and before the anniversary date of this annual survey are still not due may occur. To avoid suspension of class due to lack of survey condition when these CMS items become due, special attention should be given, when preparing for annual survey, that CMS items which should be inspected on and before the annual survey anniversary date must be completed at this annual survey.

Where CMS items which should be inspected on and before the anniversary date of this annual survey are indeed lack of survey conditions at the annual survey, such circumstances should be handled according to the requirements set out under section 3.1.9 of this Chapter.

Tips: In consideration of the special requirements of surveys by certain industry organizations, and before performing a routine annual survey, if the checklist indicates that the survey dates of CMS items as given in the survey status have already become due or overdue, while the ship is indeed not in a condition suitable for the survey of CMS items, it is recommended that the Shipping Company should apply for an extension of the relevant CMS items in accordance with the requirements set out under section 3.1.9.1) of this Chapter.

3.1.4 For CMS items permissible for the Chief Engineer's inspection by the Society, please refer to section 2.2.1 and Annex I of the Guidelines. Upon successful examination of the CMS items permissible for the Chief Engineer's inspection, the Chief Engineer shall apply for a confirmatory survey at next ship survey and submit the survey reports.

3.1.5 The amount of CMS items surveyed by the Chief Engineer should not exceed 50% per year, and at least 50% of M.E. CMS items must be examined by the surveyor of the

Society.

- 3.1.6 For CMS items not permissible for the Chief Engineer's inspection, the Shipping Company must apply for a witness survey with the attendance of the surveyor. These items should be marked as "S" in the Society's survey status.
- 3.1.7 For CMS items that have already been inspected by the Chief Engineer during the previous CMS survey cycle, relevant CMS items will be marked as "CE" in the Society's survey status. During this CMS survey cycle, the surveyor of the Society will survey these items, and withdraw the "CE" mark upon completion of survey.
- 3.1.8 Although the continuous survey items are usually required to be surveyed for only once during a special survey cycle, the survey of these items may be repeated at the request of the Shipping Company. The next survey date may be estimated from the date of the latest survey.
- 3.1.9 Extension of CMS items:
- 1) For CMS items which should be inspected on and before the anniversary date of this annual survey, if they are indeed not in a condition to be surveyed at the annual survey, an extension may be considered upon approval of the CCS Branch Office to which the survey unit is affiliated, and upon completion of the survey to the surveyor's satisfaction, an extension not exceeding three months starting from the anniversary date of the annual survey may be granted, with the condition of class also being given. Extension surveys include visual surveys of equipment and relevant function tests. Upon completion of the extended CMS items, new due dates shall still be calculated starting from the original due dates.
  - 2) For the above-mentioned survey items which should be inspected on and before the anniversary date of this annual survey, if they are still not in a condition to be surveyed within three months after the anniversary date of the annual survey, and cannot be scheduled to complete the survey, special attention must be paid by the Shipping Company and the surveyor that, if to apply for extension, such application must be particularly considered by the Headquarters of the Society.
  - 3) When an extension is to be granted to the special survey of hull, if there are still unfinished CMS items, the extension may be granted together with the special survey of hull, provided that it is approved by the Society and survey is completed to the surveyor's satisfaction.
- 3.1.10 If deficiencies or non-satisfactory items are found during survey, requests of repair or replacement and re-survey should be raised. If these cannot be solved at the survey port, reporting shall be made to the Headquarters of the Society in timely manner, and permission to be solved at the next port or condition of class not exceeding two months, as appropriate, may be granted.
- 3.1.11 When the Certificate of Classification expires, the completion survey of CMS shall be

carried out to close all unfinished survey items and verify the "*Continuous Machinery Survey Report*" (Form PC/M) and ship survey status issued in this continuous survey cycle, validating that all survey items in the CMS plan have been closed.

- 3.1.12 Where a ship applies for completion of the special survey of hull ahead of schedule, and requests for renewal of Certificate of Classification, a completion survey of the CMS shall be carried out in accordance with the requirements set out under section 3.1.11.
- 3.1.13 For damage, repair and alteration of machinery installations, application must be submitted for damage survey and/or repair survey as well as alteration survey with the attendance of the surveyor.
- 3.1.14 During the CMS survey, if the addition ,alteration or modification of equipment or CMS items listed in the ship survey checklist do not conform to the actual state of the ship, verification, confirmation and/or survey shall be carried out according to requirements, and upon satisfactory results, proper revision shall be made to the CMS plan in the Society's Ship Survey Information Management System, while a survey report shall be prepared to explain why and submitted to the Headquarters, as changes without approval of the Society may affect the validity of the class.

### **3.2 Preparations of the Shipping Company and Chief Engineer before the survey of CMS items permissible for the Chief Engineer's inspection**

- 3.2.1 For CMS items permissible for the Chief Engineer's inspection by the Society, please refer to section 2.2.1 and Annex I of the Guidelines. Upon completion of the survey of CMS items by the Chief Engineer, it is the responsibility of the Shipping Company to arrange for the surveyor to carry out a confirmatory survey. The Shipping Company shall apply for the confirmatory survey at next ship survey, while the Chief Engineer shall submit the survey report.
- 3.2.2 For stand-by equipment permissible for the Chief Engineer's inspection in open up condition, for example, auxiliary engines and main lubricating oil pumps, the Chief Engineer shall, during inspection, consult with the Shipping Company's maintenance representative and confirm that relevant inspections will not pose any harm to the ship, for example not to an extent to lead to fire disaster and constitute danger to the ship and cargo due to equipment failure at work.
- 3.2.3 The Shipping Company must direct the Chief Engineer on-board the ship to carry out the survey of CMS items. Just to take the survey of auxiliary diesel engines as an example to explain the process:
  - 1) Confirming that the dedicated tools, measuring devices and spare parts required in the open up inspection of auxiliary diesel engines are properly prepared;
  - 2) Confirm that, when two generator sets are not working, the remaining generator sets shall be in a position to ensure the power supply required for the propulsion ,safety of ship and cargo; and one of the two sets not working shall be opened up for inspection,

and the other one remains available as the stand-by set;

- 3) Auxiliary diesel engines must be fully opened up to carefully inspect all cylinder liners, cylinder covers and their accessories, pistons, piston rings, connecting rods and bearings at both ends of the connecting rod, piston pins, fasteners and explosion-proof devices of crankcase doors;
- 4) The top halves of all main bearings must be opened up, and at least the lower halves of two main bearings must be taken out for inspection. If the results are normal, the lower halves of the rest main bearings are not necessary to be opened up for inspection.
- 5) All crank pins and main journals must be inspected carefully to confirm whether there are cracks specially at the fillets and in the vicinity of oil holes;
- 6) The crank web deflection of auxiliary diesel engines shall be measured and recorded;
- 7) Cylinder liners must be measured and the wear measurements shall be recorded;
- 8) The service time of connecting rod bolts has been verified and recorded;
- 9) Lubricating oil cooler should be opened up for survey and a test shall be carried out.
- 10) The lubricating oil pumps, cooling water pumps, air compressors and etc. of all auxiliary diesel engines should be opened up for survey;
- 11) The safety systems, remote control systems and automated alarm systems of all auxiliary diesel engines must be verified in good condition at work;
- 12) Diesel engine load tests, parallel operation tests and governor tests;
- 13) Any damage, deficiency or malfunction that may result in invalidation of class shall be immediately reported to the Society;
- 14) Note: generator load tests and governor tests, parallel operation/load distribution/shutoff operation tests as well as automatic control and alarm system of the power plant must be carried out with the attendance of the surveyor. Therefore, application shall also be made for the surveyor to inspect and test relevant items at confirmatory survey upon completion of the CMS items of auxiliary diesel engines.

### **3.3 Implementing the Survey of CMS Items**

#### **3.3.1 On-site witness survey**

For CMS items submitted for witness survey by the attending surveyor, relevant parts should be opened up, cleaned and orderly sorted in advance for the surveyor's inspection. The surveyor should carry out the survey of relevant CMS items according to the technical requirements of special survey.

#### **3.3.2 Confirmatory survey**

- 1) The Chief Engineer shall carry out the examination of the CMS items permissible for the Chief Engineer's inspection by the Society. Upon completion of the survey of CMS items, the Shipping Company shall apply for confirmatory survey at next ship survey.
- 2) For CMS items permissible for the Chief Engineer's inspection, the Chief Engineer shall maintain relevant records in engine log book, maintenance history and wear measurements forms, keep all photos related to open up inspections, as far as possible, and complete the *Chief Engineer's Report to Continuous Machinery Survey* (Form PC/CE) in timely manner, for the surveyor's inspection.
- 3) The Shipping Company shall make sure that the Chief Engineer inspecting the CMS items is competent to maintain related items of classification. The Chief Engineer should submit one copy of the Chief Engineer's License of Competence, so that the

surveyor responsible for the confirmatory survey may verify its validity and authenticity.

- 4) The Chief Engineer must prepare two signed copies of the *Chief Engineer's Report to Continuous Machinery Survey* (Form PC/CE) by himself, with one copy kept on board, and the other one submitted to the surveyor for confirmatory survey. The *Chief Engineer's Report For Continuous Machinery Survey* (Form PC/CE) shall include:
  - Ship's name, Class number, flag, port of registry, the ship owner or ship management company
  - Name of the Chief Engineer and particulars of Chief Engineer's License of Competence
  - Survey items, date of examination and place of examination of the CMS items
  - Contents of survey: description of survey methods (i.e. open up inspection/inspection/maintenance/repair) shall be given. Where measurement is required, measuring records must be attached.
  - Detailed descriptions shall be made on survey findings and technical state, as well as the operational states before and after inspection.
  - Detailed descriptions must be made on replaced/repared parts, and the replaced parts must be kept on board or photographed for future inspection.
  - The inspection process should be photographed for records as far as practicable.
- 5) The Society's surveyor shall review and verify the *Chief Engineer's Report to Continuous Machinery Survey* (Form PC/CE) and work records submitted by the Chief Engineer. Upon completion of successful review, the Society's surveyor shall sign off the *Chief Engineer's Report to Continuous Machinery Survey* (Form PC/CE) to credit the completion of relevant survey items of CMS.
- 6) The surveyor may, if necessary, require a re-survey for items of the confirmatory survey.

### **3.4 Other matters that require attention of the surveyors when implementing the survey of CMS items**

- 3.4.1 For methods used by surveyors at witness surveys of CMS items, please refer to section 1.4.3 and Annex I of the Guidelines. It should be noted that the technical requirements for the survey of CMS items are exactly the same as that for the special survey.
- 3.4.2 Where deficiencies are found at certain parts during survey, the surveyor may request a full inspection for similar parts of the machinery and equipment without considering the arrangements of CMS plan.
- 3.4.3 Determination of next due date
  - 1) For CMS items to be surveyed at witness survey:

Similar to the operation requirements of the special survey, if the completion date of a CMS items is within three months before the original due date or later than the original due date, the next due date of this item shall be original due date plus special survey cycle; if the completion date is more than three months before the original due date, the next due date shall be the completion date plus special survey cycle.
  - 2) For CMS items to be surveyed at confirmatory survey:

If the date of open up inspection by the Chief Engineer is within three months before the original due date or later than the original due date, the next due date of this item shall be original due date plus special survey cycle; if the date of open up inspection by the Chief Engineer is more than three months before the original due date, the next due date shall be the date of open up inspection by the Chief Engineer plus special survey

cycle.

3.4.4 Document collection upon completion of the survey of CMS items

3.4.4.1 Upon completion of each CMS survey, the surveyor shall collect the *Chief Engineer's Report to Continuous Machinery Survey* (Form PC/CE) signed by himself. The report is prepared in two copies, with one kept on board, and the other one submitted to the surveyor for confirmatory survey.

3.4.4.2 Preparation and distribution of *Continuous Machinery Survey Report (Form PC/M)*

- 1) Survey items completed during this survey, including witness survey items and confirmatory survey items, shall be input into the Society's Ship Survey Information Management System.
- 2) When keying in the survey date according to section 3.4.3 of the Guidelines, the next due date automatically generated by the system shall be verified if it is compliant with requirements.
- 3) For CMS items inspected by the Chief Engineer, the surveyor, upon completion of confirmatory survey, should mark relevant CMS items as "CE" in the Ship Survey Information Management System.
- 4) Upon entry of relevant information, the *Continuous Machinery Survey Report* (Form PC/M) will be automatically generated.

The surveyor shall issue the *Continuous Machinery Survey Report* (Form PC/M), with one copy kept at the survey unit for archiving, one copy to be mailed to the shipowner, and one kept on board for inspection at future surveys.

## **Chapter 4 Management of CMS Information**

### **4. Management of CMS Information**

#### **4.1 The entry of CMS information when assigning "CMS" notation**

- 1) When the "CMS" notation is to be assigned, the survey unit should input the CMS plan (Form PLAN/CMS) approved by the surveyor into the Society's Ship Survey Information Management System.
- 2) Information processing for initially developed CMS plan: if continuous survey of certain items will not be scheduled within the subsequent three months, CMS plan information shall be prepared and input into the Society's Ship Survey Information Management System along with the survey report; if continuous survey of certain items will be scheduled by the Shipping Company within the subsequent three months, the CMS plan shall be input into the system when the survey request is submitted, so that more scheduling information about the subsequent continuous survey can be accessed in a timely manner.
- 3) Upon entry of the CMS plan into the Society's Ship Survey Information Management System, the management of survey status and survey cycle will be automatically done by the system. Subsequent survey arrangements shall be scheduled according to the ship survey status of the Society.

#### **4.2 Maintenance of survey information upon completion of the survey of CMS items**

Upon completion of the survey of CMS items, the *Continuous Machinery Survey Report* (Form PC/M) and information of CMS items inspected in this survey shall be uploaded into the database of the Society's Ship Survey Information Management System within two working days.

## **Chapter 5 Annex**

### **5 Annex**

**5.1 Annex I List of CMS Items and Methods of Witness Survey**

**5.2 Annex II Chief Engineer's Report for Continuous Machinery Survey (Form PC/CE)**

**5.3 Annex III Sample CMS Plan**

Annex I *List of CMS Items and Methods of Witness Survey*

CMS items	Items permissible for inspection by the Chief Engineer	Methods used by surveyors at witness survey* and precautions
<b>1. Main propulsion diesel engine</b>		
M/E cylinder covers and their attachments	Y	1
M/E cylinder liners	Y	1
M/E pistons, piston rods, stuffing and sealing	Y	1
Piston pins and their bearings	Y	1
M/E crossheads, crosshead bearings, guides	Y	1
M/E connecting rods	Y	1
Crankshafts and all bearings	S	1 Note: If the alignment or bearing wear is normal, the lower halves of the bearing may usually not be opened up for inspection.
Crank web deflection measurement	Y	3
Bedplate, crankcase, engine frame	Y	1
M/E speed governor	Y	1
Crankcase door fastening and explosion-proof release devices	Y	1, 3
Scavenging box safety release devices	Y	1, 3
M/E high-pressure fuel pumps, fuel boost pumps, electronic fuel injection system	Y	1
Scavenging pump or scavenging fan	Y	1
Turbochargers	Y	1
Air coolers	Y	1

M/E detuners and balance devices	Y	1
M/E camshaft and their transmitting gear	Y	1
M/E reversing gears	Y	1
M/E-driven bilge pumps/L.O. pumps/cooling water pumps	Y	1
M/E L.O. and fresh water coolers	Y	1
M/E foundation bolts and gaskets	Y	1 Note: Visual inspection and knock inspection
M/E starting air pipes and valves	Y	1 Note: Selected portion of pipes in the starting air system is to be removed for internal examination and acoustic test. If lubricating oil accumulation is found, in addition to steam blowing, the portions of pipes adjacent to main starting valve and air discharge from compressor are to be removed for examination.
Test of initial start arrangements	S	2
M/E maneuvering test	S	2
<b>2. Main gas turbine (full set)</b>		
Impellers or blading, rotors, casings and rotors of air compressors, combustion chambers, intercoolers, gas and air piping, starting and reversing arrangements, and etc.	S	1 (full set) Note: reference can be made to Section 5.9.4.7, Chapter 5, Part 1 under the <i>Rules for Classification of Sea-going Steel Ships</i> of the Society
Main gas turbine operation test	S	2
<b>3. Main steam turbine (full set)</b>		
Turbine rotors, blading, bearings, sealing, shrouding, nozzles, nozzle valves, control valves, foundation expansion arrangements, and etc.	S	1 (full set) Note: reference can be made to Section 5.9.4.8, Chapter 5, Part 1 under the <i>Rules for Classification of Sea-going Steel Ships</i> of the Society
Main steam turbine running test	S	2

<b>4. Electrical propulsion installations</b>		
Propulsion electric motors	Y	1
Diesel engines of propulsion generators	Y	1
Propulsion generators	Y	1
Propulsion electric motor running test	Y	2
<b>5. Power transmission system and shafting</b>		1
Clutches	S	1
Flexible coupling (rubber/hydraulic/gear)	S	1
Reduction gearboxes and reversing gears	S	1 Note 1: acceleration/reduction gears, flexible couplings and clutches should be opened up for inspections, so as to confirm that gears, auxiliary gears, shafts, bearings, thrust shafts, thrust bearings, lubrication systems and etc. are working in normal condition. Note 2: for conventional gears up to 1120 Kw and below as well as all epicycloidal gears, it is not necessary to inspect in open up condition if the ship owner can provide satisfactory running records.
Thrust shafts and their bearings	Y	1 Note: If the alignment or bearing wear is normal, it is okay to do sampling inspection.
Intermediate shafts and their bearings	Y	1 Note: If the alignment or bearing wear is normal, the lower halves of the bearing may usually not be opened up for inspection.
Foundation bolts and gaskets for the bearing seats of gearboxes/thrust shafts/intermediate shafts	Y	1 Note: Visual inspection and knock inspection

<b>6. Auxiliary engines</b>		
Auxiliary diesel engines for power generation including pumps driven by them (main/mooring/emergency)	Y	1 Note: Please refer to Chapter 3, Section 3.2.3 of the Guidelines.
Auxiliary steam turbines for generator	S	1 Note: reference can be made to Section 5.9.4.8, Chapter 5, Part 1 under the <i>Rules for Classification of Sea-going Steel Ships</i> of the Society
Generator set load tests and speed governor tests	S	2 Note: Relevant tests must be witnessed by the attending surveyor.
Auxiliary diesel engines for important auxiliary machinery installations	Y	1 Note: reference can be made to Section 3.2.4, Chapter 3 under the Guidelines.
Auxiliary steam turbines for important auxiliary machinery installations	S	1 Note: reference can be made to Section 5.9.4.8, Chapter 5, Part 1 under the <i>Rules for Classification of Sea-going Steel Ships</i> of the Society
Foundation bolts and gaskets for auxiliary engines	Y	1 Note: Visual inspection and knock inspection
<b>7. Air vessels (applicable to air vessels with a working pressure at 0.7 MPa and above)</b>		
Main air vessels	S	1
Auxiliary air vessels	S	Note 1: In case of any corrosion or damage is found, hydraulic pressure test should be carried out to determine its
Control air vessels	S	

Emergency air vessels	S	working pressure. Note 2: Their relief valves are to be checked in service conditions: Note 3: If it is difficult to open up certain small heat exchangers or pressure vessels with working pressures of 0.7 MPa and over, an alternative hydraulic test to 1.25 times the working pressure may be accepted.
<b>8. Auxiliary machinery</b>		
<b>a. Air compressors</b>		
Main air compressors	Y	1
Auxiliary air compressors	Y	1
Control air compressors	Y	1
Emergency air compressors	Y	1
<b>b. Independently driven pumps and their motors and starters</b>		
S.W. cooling pumps: main S.W. cooling pumps, auxiliary S.W. cooling pumps, S.W. cooling pumps for L.O. coolers, S.W. general service pumps	Y	1 Note: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted.
Fresh water cooling pumps: Circulating water cooling pumps for main steam turbines, cylinder jacket F.W. cooling pumps, piston fresh water/oil cooling pumps, fuel valve F.W./oil cooling pumps, turbocharger F.W. cooling pumps, generator F.W. cooling pumps, air cooler F.W. cooling pumps	Y	1 Note: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted.
Fuel oil pumps: Fuel oil supply pumps, fuel oil service pumps, fuel oil transfer pumps, fuel oil circulating pumps, boiler combustion pumps, fuel oil purifier	Y	1 Note: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted.

L.O. pumps: M/E L.O. pumps, M/E camshaft L.O. pumps, reduction gearbox L.O. pumps, M/E crosshead L.O. pumps, controllable pitch propeller L.O. pumps, stern tube L.O. pumps (excluding the case where Stern Tube L.O. system by natural circulation in an emergency case is also available), M/E cylinder oil pumps, rocker arm oil pumps, system oil pumps (Pumps for feeding oil to Hydraulic systems for Control and adjustment of essential auxiliaries for propulsion), L.O. purifier	Y	1 Note: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted.
Feed water pump, condensate pumps: Feed water pumps, boiler water circulating pumps, condensate pumps (main turbines/generator turbines/cargo oil turbines/ballast pump turbines), drain pumps	Y	1 Note: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted.
Thermal oil pumps: Thermal oil circulation pumps, thermal oil feed pumps	Y	1 Note: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted.
Bilge pumps, ballast pumps, fire pumps: Bilge pumps (excluding those for Oily Bilge & Oily Water Separators), ballast pumps, general service pumps, fire pumps (excluding emergency fire pumps)	Y	1 Note: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted.
<b>c. Heat exchanger</b>		
Condensers& feed water heaters: Main condensers, auxiliary condensers, atmospheric condensers, drain coolers, feed water heaters, deaerators	Y	1 Note 1: In case of any corrosion or damage is found, hydraulic pressure test should be carried out to determine its working

<p>Coolers</p> <p>Main F.W. coolers, fuel valve F.W./oil coolers, turbocharger F.W. coolers, cylinder jacket F.W. coolers, piston F.W./oil coolers, F.W. coolers for the prime mover of generators, main L.O. coolers, turbocharger L.O. coolers, camshaft L.O. coolers, reduction gearbox L.O. coolers, control oil coolers, controllable pitch propeller L.O. coolers, stern tube L.O. coolers, generator turbine L.O. coolers, air cooler freshwater coolers, fuel oil coolers</p>	<p>Y</p>	<p>pressure.</p> <p>Note 2: Their relief valves are to be checked in service conditions:</p> <p>Note 3: If it is difficult to open up certain small heat exchangers or pressure vessels with working pressures of 0.7 MPa and over, an alternative hydraulic test to 1.25 times the working pressure may be accepted.</p>
<p>Oil heaters</p> <p>Fuel oil heaters, L.O. heaters</p>	<p>Y</p>	<p>1</p>
<p><b>d. Main boiler fresh water generators for driving the main steam turbine</b></p>	<p>Y</p>	<p>1</p>
<p><b>e. Electrical installations</b></p>		
<p>All generators</p>	<p>Y</p>	<p>1</p> <p>Note: Relevant tests must be witnessed by the attending surveyor and, if necessary, a full load test may be required;</p>
<p>Generator parallel operation, load distribution and shutoff</p>	<p>S</p>	<p>2; Relevant tests must be witnessed by the attending surveyor</p>
<p>Insulation resistance (electrical equipment and circuits)</p>	<p>Y</p>	<p>3</p> <p>Note 1: Insulation resistance of electrical circuits in dangerous zones (such as cargo pump rooms and spaces adjacent to cargo tanks) is to be tested, but in cases where a proper record of testing is maintained, consideration should be given to accepting recent readings.</p> <p>Note 2: It is recommended that ship owners to maintain records of periodical measurement of insulation resistance, so as to be submitted to the surveyor for inspection.</p>

Equipment within dangerous zones	Y	<p>General inspection</p> <p>Note: During survey, it shall be noted that, electrical equipment in dangerous zones or circuits passing through dangerous zones are to be examined to verify that there are no dangers, defects, improperly installed or unapproved equipment and dead end wiring, etc.</p>
Main switchboard, emergency switchboard, distribution boards and their attachments	Y	<p>2, 3</p> <p>Note: Inspect and test overcurrent protection and fuse box</p>
Air circuit breaker of the generators (main switch)	S	<p>1, 3;</p> <p>Note: Test to verify its protection devices, including overcurrent (long-time and short-time delay), under voltage, reverse-power, and etc.</p>
All cables	Y	<p>2</p> <p>Note 1: Confirm that fittings and protective covers are not loose.</p> <p>Note 2: During survey, it shall be noted that, inspection of the circuits passing through dangerous zones shall be carried out to confirm that there are no danger, defects or dead end wiring, and etc.</p>
Wet-type transformers of essential power supply	Y	<p>1</p> <p>Note: The owner is to submit the liquid sample to an authoritative institution for testing its breakdown voltage, acidity and moisture. The report of test results is to be submitted to the Surveyor.</p>
Emergency power source together with its automatic device and auxiliary power source, including uninterrupted power supply (UPS) for automation system	Y	<p>2</p>
Main lighting, emergency lighting, temporary emergency lighting, additional lighting	Y	<p>2</p>

Inspections shall be carried out to cables for electric propulsion units as well as frequency converters, transformers, all ancillary equipment and control units, while the insulation resistance should also be measured.	Y	2, 3
Navigation light, general alarm, public address system, fire detection system, engineer's alarm system, bilge water detection system.	Y	2
<b>f. Deck machinery</b>		
Steering gear Includes their pumps, steering gear motors	Y	1 Note: The system safety pressure release valves are to be tested and checked their setting, and if necessary, a full-load test of steering motors may be required.
Anchor windlass and machinery (including their hydraulic pumps)	Y	1 Note: Carrying out partial test of slipping and hauling anchors by windlass, checking the brake and foundation, and testing of safety devices.
Mooring winches (including their hydraulic pumps)	Y	1
Hydraulic motors that drive cargo oil pumps	Y	1
<b>g. Forced and draught fans at engine room and cargo holds</b>	Y	1
<b>h. Cargo pump installations</b>		
Cargo pumps (including chemicals and liquid gas cargo pumps)	Y	1
Stripping pumps	Y	1
Tank washing pumps	Y	1
Tank washing water heaters	Y	1

Drain condensers	Y	1
<b>i. Piping, valves and accessories</b>		
Compressed air piping and its valves, cocks and filters	Y	2 Note: Inspection and test shall be carried out under working pressure, and if necessary, hydraulic pressure test and valve open up inspections may be required.
Fuel oil piping and its valves, cocks and filters	Y	
L.O. piping and its valves, cocks and filters	Y	
S.W. cooling piping and its valves, cocks and filters	Y	
Fresh water cooling piping and its valves, cocks and filters	Y	
Feed water supply piping and its valves, cocks and filters	Y	
Steam and condensate piping and its valves, cocks and filters in engine room	Y	
Thermal oil piping and its valves, cocks and filters	Y	
Bilge water piping and its valves, cocks and filters in engine room	Y	
Ballast water piping and its valves, cocks and filters in engine room	Y	
Hydraulic oil piping and its valves, cocks and filters in the engine room	Y	

Remote control valves and collision bulkhead valves	Y	
Pressure/vacuum valves	Y	1, 3
<b>j. Refrigerated cargo installations, including</b>		
Reciprocating refrigeration compressors	Y	1 Note 1: at least one of the refrigeration compressors for the refrigerated cargo installations should be inspected at the witness of the surveyor.
Rotary screw compressors	Y	1 Note: at least one of the refrigeration compressors for the refrigerated cargo installations should be inspected at the witness of the surveyor.
Condenser cooling pumps	Y	1
Refrigerant circulation pumps	Y	1
Brine pumps	Y	1
Refrigerant condensers	Y	1 Note: For condensers and evaporators of difference structures, the Society's <i>Rules for Classification of Sea-going Steel Ships</i> has provided different requirements on hydraulic pressure test.

Refrigerant evaporators	Y	1 Note: For condensers and evaporators of difference structures, the Society's <i>Rules for Classification of Sea-going Steel Ships</i> has provided different requirements on hydraulic pressure test.
Refrigeration test and thermal resistance test of the refrigerated cargo systems	Y	2
<b>k. For liquefied gas tankers, including</b>		
Reciprocating refrigeration compressors	Y	1
Reciprocating cargo gas compressors	Y	1
Condenser cooling pumps	Y	1
Cargo circulating pump (if any)	Y	1
<b>l. Approved inert gas system</b>		
Inert gas piping system	Y	1
Fuel oil type inert gas generators	Y	1
Scrubbers	Y	Note: confirming whether there are traces of gas or effluent leakage
Inert gas distribution pipes and check valves, including soot blower interlock devices	Y	1
Inert gas fans	Y	1
Deck water seal and the second non-return device	Y	1
Pressure-vacuum breakers	Y	1
Cooling water system, including overboard discharge pipes and valves of outflow pipes and scrubber	Y	1; Note: valves should be inspected in open up condition.
All automatic closing devices and alarms	Y	2

<b>m. Additional requirements for ships with machinery automation notation</b>		
<p>Automated system of main propulsion machinery:</p> <p>a. main control system (including automatic control of start, operation, stopping and reversing of main propulsion machinery, remote control of engine room centralized control room and navigating bridge);</p> <p>b. control system changeover and communication;</p> <p>c. safety system;</p> <p>d. alarm system;</p> <p>e. overriding control system;</p> <p>f. automatic start of standby machinery;</p> <p>g. confirming changeover to manual control in case of failure of remote control system;</p> <p>h. function test of control, safety and alarm systems when power (electrical, hydraulic or pneumatic) is restored after a power failure.</p>	Y	<p style="text-align: center;">2</p> <p>Note 1: Checking records of fault recorder, reviewing log book entries regarding automatic and remote control equipment, records of on-board alarm point inspection and calibration, as well as records of on-board safety protection system tests and simulation function tests to confirm operational reliability of all systems.</p> <p>Note 2: It is recommended that the ship owner should maintain</p> <p>a. records of periodical inspection and calibration of alarm points;</p> <p>b. records of on-board machinery and equipment safety protection device tests.</p>
<p>Local control station, engine room centralized control station, bridge control station:</p>	Y	
<p>M/E oil mist detectors:</p>	Y	
<p>Automated system of boilers (including thermal oil boilers), including:</p> <p>a. safety system for burning (including automatically stopping fuel supply pump, automatically starting and stopping feed pump, scavenging, automatically controlling temperature);</p> <p>b. monitoring and alarm systems;</p> <p>c. manual control.</p>	Y	

Automatic controls and alarms of generating system and power plant, including: Automatic start, switch-in, parallel operation, load distribution and shutoff of standby generating sets) are to be examined.	S	
Automatic control and alarms of other essential machinery and equipment: such as incinerators, cargo pump turbines, cargo oil pump engines, oil tanks, heaters (electric/steam), and so on. Including: a. performance test of control, safety and alarm systems (including alarm indicators, displays) are to be carried out so far as is practicable; b. components (elements, valves, actuators, instruments) of automatic and remote control systems are to be visually examined and if necessary, opened up for examination and test.	Y	
Maneuvering tests of suction valves and discharge valves below waterline	Y	2
<b>n. Separate fuel tanks</b> (not as part of the hull structure)	Y	1 Note: Upon satisfactory external inspection, fuel oil tanks below 10 years may be exempt from internal inspections. Hydraulic pressure test may be carried out if the surveyor deems necessary.
<b>9. Other items the Society considers necessary to be covered under the CMS system</b>	To be determined by the surveyor according to practical situations	To be determined by the surveyor according to practical situations
Y - surveyable CMS items by Chief Engineers, yet to be credited by a Surveyor in the Confirmatory Survey. S - CMS items that must be surveyed a Surveyor.		

※ Methods used by surveyors at witness surveys of CMS items:

- 1) **Survey method 1:** to carry out full open-up surveys or partial open-up surveys(if accepted by the surveyor)of the CMS items, as well as related function tests and/or hydraulic pressure test (including hydraulic pressure test when the surveyor deems necessary).
- 2) **Survey method 2:** to perform function tests of the CMS items.
- 3) **Survey method 3:** to perform measurement and/or adjusting of the CMS items.

## 中国船级社

## China Classification Society

## 轮机长循环检验报告

## Report to Continuous Machinery Survey

(仅供轮机长使用)

(for Chief Engineer only)

船名 Ship's Name		船舶登记号 Class No.	
船旗国 Flag		船籍港 Port of Registry	
船舶所有人或船舶管理公司 Ship owner or Management Company			

## 轮机长适任证书

## Chief Engineer's License

轮机长姓名 Name of Chief Engineer		轮机长适任证书编号 Chief Engineer's License No.	
签发适任证书的主管机关 Issuing Administration of License		轮机长适任证书有效期 Validity of C/E's License	

- 1、本报告用于船上轮机长记录其进行轮机循环检验（在此之后称为“CMS”）的结果，轮机长完成轮机循环检验项目的检查结果应记录在以下附页中。

This form is to be used to record the results of the examination of Continuous Machinery Survey (hereinafter called "CMS") by Chief Engineer. The results of examination of CMS items by Chief Engineers are to be recorded on the following Supplement Sheet.

- 2、须准备两份由轮机长签署的本报告,一份保留在船,另一份提交给进行确认检验的验船师。  
Two signed copies of this report are to be prepared by Chief Engineer. One copy is to be kept on board and the other is to be given to the Surveyor who carried out confirmatory survey.
- 3、轮机长完成许可的 CMS 项目后,船舶经营人负责安排验船师登轮进行确认检验。确认检验可在下次船舶检验时提交验船师。下面署名的验船师应确认相关项目已被维护在良好状态。  
After the completion of the surveyable CMS items by the Chief Engineer, it is the responsibility of the ship Operator to arrange for the attendance of a Surveyor to credit such items. Such confirmatory survey may be carried out at the time of ship's next survey. The undersigned surveyor should confirm that all of the following CMS items are maintained in good order.
- 4、本报告的填写说明详见 CCS 《轮机循环检验实施指南》第 3.3.2 条  
The instruction of filling in this report is given in section 3.3.2 in **the Guidance for Implementing the CMS** of this society.

轮机长签名

Signature of Chief Engineer:

确认检验:

Confirmatory Survey:

Place: \_\_\_\_\_ (Abc Sxxxxxx)

Date: \_\_\_\_\_ Surveyor to CHINA CLASSIFICATION SOCIETY

轮机长执行 CMS 项目检查的注意事项:

Reminders to the Chief Engineers when conducting the examination of CMS items:

- 1) CMS 项目应按时完成, 从而使所有 CMS 项目的每次检验间隔时间都不超过 5 年。  
CMS item(s) is (are) to be surveyed on time so that each survey interval for all CMS items may not exceed 5 years.
- 2) 根据我社现行《钢质海船入级规范》有关规定, 如年度检验时, 到期或过期的循环检验项目未完成, 且未经 CCS 同意展期, 将导致船级暂停。  
According to the regulation of present “Rules for Classification of Sea Going Steel Ships”, the vessel’s class might be suspended if due or overdue continuous survey item(s) has (have) not been dealt with and extension is not granted by this society at time of annual survey.
- 3) 可由轮机长进行的 CMS 项目详见 CCS《轮机循环检验实施指南》第 2.2.1 条。  
A list of the examination of surveyable CMS Items by Chief Engineers is given in section 2.2.1 in **the Guidance for Implementing the CMS** of this society.
- 4) 轮机长检验的 CMS 项目的总数每年不得超过该年规定检验项目的百分之五十, 且主机项目必须有一半以上由本社验船师检验。  
The amount of CMS items surveyed by the Chief Engineer should not exceed 50% per year, and at least 50% of M.E. CMS items should be examined by the Surveyor of the Society.
- 5) 在上一个 CMS 周期内已由轮机长检验过的项目 (在 CCS 检验信息中标有“CE”的检验项目), 在本次 CMS 周期内, 将由本社验船师对其进行检验。  
Items that have been examined by the Chief Engineer at last CMS cycle (marked with “CE” in survey status of this Society) are to be examined by the surveyor of this Society at this CMS cycle.
- 6) 轮机长完成许可的 CMS 项目后, 应在轮机日志、维护记录和磨损测量记录上作相应的记录。以供在提交确认检验时出示给验船师。  
After the completion of the surveyable CMS items, the Chief Engineer is to make relevant records in engine log book, maintenance history and wear measurements forms, so to present to the attending surveyor at confirmatory survey.
- 7) 验船师认为有必要时, 可要求对确认检验项目重新进行检验。  
The surveyor may, if necessary, require a re-survey for items surveyed by the chief engineer.
- 8) 船舶发生任何可能使已授予的船级趋于失效的损坏、缺陷、故障或搁浅应立即向 CCS 单位报告。  
If there is any damage, defect, breakdown or grounding which tends to invalidate the assigned class of the vessel, a report is to be made to China Classification Society office without delay.
- 9) 所有属于船级条件的 CMS 项目不在轮机长的检验范围内, 它应由我社验船师进行检验。  
All CMS items related to the condition of class is not to be dealt with by Chief Engineers, but by Surveyor of this Society.
- 10) 除上述条款外, 本社的责任详见 CCS 现行《钢质海船入级规范》有关规定。  
In addition to the above provisions, the Liability of this Society is contained in the current regulations of CCS “Rules for Classification of Sea Going Steel Ships”.

**轮机循环检验报告附页:**

**Supplement Sheet of Report to Continuous Machinery Survey**

兹证明下面署名轮机长对下述项目进行了检查，情况正常

This is to certify that the undersigned chief engineer examined the following items, and found satisfactory.

项目编号 Item No.	检验项目 Survey items	检查日期 Date of examination	检查地点 Place of examination

检验内容 (Contents of survey) :

检验发现及状况 (Survey finding and condition) :

更换及修理的部件 (如有时) (Parts replaced/repared, if any.) :

项目编号 Item No.	检验项目 Survey items	检查日期 Date of examination	检查地点 Place of examination

检验内容 (Contents of survey) :

检验发现及状况 (Survey finding and condition) :

更换及修理的部件 (如有时) (Parts replaced/repared, if any.) :

### Annex III Sample CMS Plan

Mark	Code	JOB No.	Due Date	Credited Date	Postponed till	Next Due Date	Method of verification	C.E.	Modify date
AT	*** ADDITION TO MACH. HAVING AUTOMMATION CLASS NOTATION ***								
AT_002	BOILER AUTOMATIC CONTROL SYSTEM						2	Y	
AT_003	BOILER COMBUSTION AND STEAM PRESSURE CONTROLS						2	Y	
AT_004	BOILER WATER LEVEL CONTROL						2	Y	
AT_005	BRIDGE CONTROL						2	Y	
AT_006	BILGE LEVEL DETECTION AND ALARM						2	Y	
AT_007	CENTRALIZED CONTROL STATION IN ENGINE ROOM						2	Y	
AT_008	COMM.FOR MAIN,LOCAL,BRIDGE STATIONS AND ENG.ROOM						2	Y	
AT_009	CONTROLS TRANSFER TEST						2	Y	
AT_010	EMERGENCY SHUT OFF						2	Y	
AT_011	FIRE DETECTION AND PREVENTION IN ENGINE ROOM						2	Y	
AT_012	LOCAL CONTROL						2	Y	
AT_013	MAIN CONTROL						2	Y	
AT_014	STAND-BY MACHINERY AUTOMATIC STARTING						2	Y	
AT_015	BILGE LEVEL DETECTION AND ALARM						2	Y	
AT_016	EMERGENCY POWER SUPPLY						2	Y	

BS	*** BILGE,BALLAST AND FIRE FIGHTING SYSTEM ***								
BS_002_001	No.1 BALLAST PUMP AND MOTOR						1	Y	
BS_002_001	No.2 BALLAST PUMP AND MOTOR						1	Y	
BS_003_002	EMERG. FIRE PUMP AND DRIVEN						1	Y	
BS_004_002	BILGE & GENERAL SERVICE PUMP AND MOTOR						1	Y	
BS_004_012	FIRE & GENERAL SERVICE PUMP AND MOTOR						1	Y	
BS_005_002	SLUDGE PUMP AND MOTOR						1	Y	
BS_006_005	BILGE & BALLAST SYSTEM PIPING VALVES AND FITTINGS IN ENGINE ROOM						2	Y	
BS_006_006	BILGE WELL						1	Y	
BS_006_008	REMOTE CONTROL VALVES TEST						2	Y	
BS_007	FIRE FIGHTING EQUIPMENT						1	Y	
CA	** COMPRESSED AIR **								
CA_001_001	No.1 MAIN AIR COMPRESSOR AND SAFETY DEVICES						1	Y	
CA_001_001	No.2 MAIN AIR COMPRESSOR AND SAFETY DEVICES						1	Y	
CA_001_002	AUX. AIR COMPRESSOR AND SAFETY DEVICES						1	Y	
CA_001_003	EMERGENCY AIR COMPRESSOR AND SAFETY						1	Y	

	DEVICES								
CA_002_001_A	No.1 MAIN AIR RECEIVER AND SAFTY DEVICES						1	S	
CA_002_001_A	No.2 MAIN AIR RECEIVER AND SAFTY DEVICES						1	S	
CA_002_002	AUX.AIR RECEIVER AND SAFETY DEVICES						1	S	
CA_002_003_A	EMERG. AIR RECEIVER						1	S	
CA_002_004	CONTROL AIR RECEIVER AND SAFTY VALVE						1	S	
CA_002_006	GENERAL AIR RECEIVER AND SAFETY DEVICES						1	S	
CA_003	COMPRESSED AIR PIPING, VALVES AND FITTINGS						2	Y	
CA_004	FIRST START ARRANGEMENT TRIAL						2	S	
CL	** COOLING SYSTEM **								
CL_001_001	F.W. TRANSFER PUMP AND MOTOR						2	Y	
CL_002_001	No.1 M.E. F.W. COOLING PUMP AND MOTOR						2	Y	
CL_002_001	No.2 M.E. F.W. COOLING PUMP AND MOTOR						1	Y	
CL_003_002	AUX.E.F.W. COOLING PUMP(AUX.E. ATTACHED)						1	Y	
CL_004_002	No.1 MAIN S.W. COOLING PUMP AND MOTOR						1	Y	
CL_004_002	No.2 MAIN S.W. COOLING PUMP AND MOTOR						1	Y	
CL_004_004	No.1 AUX. S.W. COOLING PUMP & MOTOR						1	Y	

CL_004_004	No.2 AUX. S.W. COOLING PUMP & MOTOR						1	Y	
	S.W.COOLING PIPES,VALVES AND FITTINGS						2	Y	
	F.W.COOLING PIPES,VALVES AND FITTINGS						2	Y	
DM	** DECK MANCHINE AND HYD. SYSTEM **								
DM_001_001	STEERING GEAR						1	Y	
DM_002_001	WINDLASS						1	Y	
DM_002_002	WINDLASS HYD. OIL PUMP AND MOTOR						1	Y	
DM_003_001	MOORING WINCH						1	Y	
DM_003_003	STERN WINCH						1	Y	
DM_004_001	HYD.PUMP AND MOTOR						1	Y	
DM_004_003	HOLD HYD. OIL PUMP AND MOTOR						1	Y	
DM_004_004	HYD. PUMP FOR STEERING GEAR								
	HYD. OIL PIPES,VALVES AND FITTINGS IN ENGINE ROOM						2	Y	
EL	*** ELECTRICAL INSTALLATION AND AUX.ENG. ***								
EL_001_001	No.1 GENERATOR DIESEL ENGINE						1	Y	
EL_001_001	No.2 GENERATOR DIESEL ENGINE						1	Y	
EL_001_001	No.3 GENERATOR DIESEL ENGINE						1	Y	

EL_001_002	No.1 AUX. TURBINE						1	S	
EL_001_002	No.2 AUX. TURBINE						1	S	
EL_001_002	No.3 AUX. TURBINE						1	S	
EL_002_001	No.1 GENERATOR						1	Y	
EL_002_001	No.2 GENERATOR						1	Y	
EL_002_001	No.3 GENERATOR						1	Y	
EL_003_001	MAIN SWITCHBOARD AND FITTINGS						2、3	Y	
EL_003_002	SECTION SWITCHBOARD AND FITTINGS						2、3	Y	
EL_003_003	CIRCUIT BREAKERS						2、3	S	
EL_004_001	EMERG. GENERATOR DIESEL ENGINE						1	Y	
EL_004_002	EMERGENCY GENERATOR SET AND AUT.CONTORL SYS						2、3	Y	
EL_004_003	EMERGENCY SWITCHBOARD AND FITTINGS						2、3	Y	
EL_005	EMERG.BATTERY SOURCE AND SWITCHBOARD						2、3	Y	
EL_006	CABLES						2	Y	
EL_007_001	EMERGENCY LIGHTING						2	Y	
EL_007_002	NAVIGATION LIGHTING AND INDICATORS						2	Y	
EL_008_001	GENERATOR SET AND AUT.CONTRIL SYS						2	S	
EL_008_002	GENERATOR DIESEL ENGINE SAFTY DEVICE						2	Y	
EL_010_001	GENERATOR OPERTING TEST UNDER LOAD AND THE GOVERNOR TEST						2	S	
EL_010_002							2	S	

	GENERATOR PARALLEL TEST								
EL_010_005	INSULATION RESISTANCE						3	Y	
FO	** FUEL OIL SYSTEM **								
FO_001_001_B	M.E. F.O.SERVICE PUMP AND MOTOR						1	Y	
FO_001_004_A	F.O. TRANSFER PUMP AND MOTOR						1	Y	
FO_001_005_B	M.E. F.O. CIRCULATING PUMP AND MOTOR						1	Y	
FO_001_010	F.O. PURIFIER SUPPLY PUMP & MOTOR						1	Y	
FO_002_002_A	AUX.E. F.O. SERVICE PUMP AND MOTOR						1	Y	
FO_003_012	D.O. TRANSFER PUMP AND MOTOR						1	Y	
FO_003_017	D. O. PURIFIER SUPPLY PUMP & MOTOR						1	Y	
FO_005	D.O.PIPES, VALVES AND FITTINGS						2	Y	
FO_006	F.O.PIPES, VALVES AND FITTINGS						2	Y	
HE	*** HEAT EXCHANGER AND PURIFIER DEVICE***								
HE_001_001	M.E. L.O. COOLER						1	Y	
HE_002_001	No.1 L.O. PURIFIER						1	Y	
HE_002_001	No.2 L.O. PURIFIER						1	Y	
HE_002_002	L.O. PREHEATER FOR PURIFIER						1	Y	
HE_003_001	M.E. F.O. HEATER						1	Y	
HE_003_004	AUX.E. F.O. HEATER						1	Y	
HE_003_008	BOILER F.O. HEATER						1	Y	

HE_005_000	No.1 F.O. PURIFIER						1	Y	
HE_005_000	No.2 F.O. PURIFIER						1	Y	
HE_005_001	No.1 F.O. PREHEATER FOR PURIFIER						1	Y	
HE_005_001	No.2 F.O. PREHEATER FOR PURIFIER						1	Y	
HE_005_002	No.1 H.F.O. PURIFIER						1	Y	
HE_005_002	No.2 H.F.O. PURIFIER						1	Y	
HE_006_002	M.E. F.W. COOLER						1	Y	
HE_006_008	No.1 AUX.E. F.W. COOLER						1	Y	
HE_006_008	No.2 AUX.E. F.W. COOLER						1	Y	
HE_006_011	AIR COMPR. F.W. COOLER						1	Y	
HE_008_001	M.E. SUPERCHARGING AIR COOLER						1	Y	
IT	*** INDEPENDENT OIL TANKS ***								
IT_001_003_001	D.O. SERVICE TANK						1	Y	
IT_001_003_002	AUX. BOILER D.O. SERVICE TANK						1	Y	
IT_001_003_006	EMERG. GENERATOR D.O. TANK						1	Y	
IT_001_004_001	D.O. SETTLING TANK						1	Y	
IT_002_002_B	FUEL OVERFLOW TANK						1	Y	
IT_002_007	F.O. SLUDGE TANK						1	Y	
IT_002_009	H.F.O. SERVICE TANK						1	Y	
IT_002_010	H.F.O. SETTING TANK						1	Y	
IT_003_002_001	L.O. STORAGE TANK						1	Y	
IT_003_002_003	AUX. E. L.O. STORAGE TANK						1	Y	
IT_003_004	L.O. OVERFLOW TANK						1	Y	
IT_003_006	L.O. SETTLING TANK						1	Y	
IT_003_007_002	AUX.E. L.O. SETTLING TANK						1	Y	
IT_003_009	L.O. SLUDGE TANK						1	Y	

IT_003_010_005	CYL. OIL DAILY TANK						1	Y	
IT_003_010_006	CYL. OIL STORAGE TANK						1	Y	
IT_003_010_008	TURBOCHARGER L.O. TANK						1	Y	
IT_003_010_010	STERN TUBE L.O. GRAVITY TANK						1	Y	
IT_003_010_012	STERN TUBE SEALING OIL TANK						1	Y	
IT_003_010_020	AUX. E. PURIFIED L.O. TANK						1	Y	
IT_004_003	F.O. & L.O. DRAIN TANK						1	Y	
IT_007_003	WASTE OIL TANK						1	Y	
LO	** LUB. OIL SYSTEM **								
LO_001_002	No.1 M.E. L.O. PUMP AND MOTOR						1	Y	
LO_001_002	No.2 M.E. L.O. PUMP AND MOTOR						1	Y	
LO_001_005	L.O. TRANSFER PUMP						1	Y	
LO_001_011_A	CAMSHAFT L.O. PUMP AND MOTOR						1	Y	
LO_001_012_B	AUX. E. PRE. L.O. PUMP AND MOTOR						1	Y	
LO_001_012_C	AUX.E.L.O. PUMP, AUX.ENG. ATTACHED						1	Y	
LO_001_015	STERN TUBE L.O. PUMP AND MOTOR						1	Y	
	L.O.PIPES/VALVES/FILTERS						2	Y	
MP_ME_000_001 _A	M.E. EXH.GAS TURBOCHARGER						1	Y	
MP_ME_000_002 _A	M.E. EMERG. AIR BLOWER						1	Y	
MP_ME_000_003 _002	TURNING GEAR						1	Y	

MP_ME_004	** MAIN DIESEL ENGINE (CROSSHEAD INLINE) **						1	Y	
MP_ME_004_001	No.1 CYL.COVER & LINER,PISTON & ROD,VALVES ETC.						1	Y	
MP_ME_004_001	No.2 CYL.COVER & LINER,PISTON & ROD,VALVES ETC.						1	Y	
MP_ME_004_001	No.3 CYL.COVER & LINER,PISTON & ROD,VALVES ETC.						1	Y	
MP_ME_004_001	No.4 CYL.COVER & LINER,PISTON & ROD,VALVES ETC.						1	Y	
MP_ME_004_001	No.5 CYL.COVER & LINER,PISTON & ROD,VALVES ETC.						1	Y	
MP_ME_004_001	No.6 CYL.COVER & LINER,PISTON & ROD,VALVES ETC.						1	Y	
MP_ME_004_005	No.1 CONN.ROD,CROSSHEAD PIN & BEARING AND GUIDES						1	Y	
MP_ME_004_005	No.2 CONN.ROD,CROSSHEAD PIN & BEARING AND GUIDES						1	Y	
MP_ME_004_005	No.3 CONN.ROD,CROSSHEAD PIN & BEARING AND GUIDES						1	Y	
MP_ME_004_005	No.4 CONN.ROD,CROSSHEAD PIN & BEARING AND GUIDES						1	Y	

MP_ME_004_005	No.5 CONN.ROD,CROSSHEAD PIN & BEARING AND GUIDES						1	Y	
MP_ME_004_005	No.6 CONN.ROD,CROSSHEAD PIN & BEARING AND GUIDES						1	Y	
MP_ME_004_006 _A	No.1 CRANK PIN ,BEARING AND WEBS						1	S	
MP_ME_004_006 _A	No.2 CRANK PIN ,BEARING AND WEBS						1	S	
MP_ME_004_006 _A	No.3 CRANK PIN ,BEARING AND WEBS						1	S	
MP_ME_004_006 _A	No.4 CRANK PIN ,BEARING AND WEBS						1	S	
MP_ME_004_006 _A	No.5 CRANK PIN ,BEARING AND WEBS						1	S	
MP_ME_004_006 _A	No.6 CRANK PIN ,BEARING AND WEBS						1	S	
MP_ME_004_009	No.1 MAIN BEARING AND JOURNAL						1	S	
MP_ME_004_009	No.2 MAIN BEARING AND JOURNAL						1	S	
MP_ME_004_009	No.3 MAIN BEARING AND JOURNAL						1	S	
MP_ME_004_009	No.4 MAIN BEARING AND JOURNAL						1	S	
MP_ME_004_009	No.5 MAIN BEARING AND JOURNAL						1	S	
MP_ME_004_009	No.6 MAIN BEARING AND JOURNAL						1	S	
MP_ME_004_009	No.7 MAIN BEARING AND JOURNAL						1	S	

MP_ME_004_009	No.8 MAIN BEARING AND JOURNAL						1	S	
MP_ME_004_010	CAMSHAFT(S) AND DRIVE(S)						1	Y	
MP_ME_004_011	CRANKSHAFT DEFLECTIONS						3	Y	
MP_ME_004_013	ENGINE FRAME AND BEDPLATE						1	Y	
MP_ME_004_014	HOLDING DOWN BOLTS AND CHOCKS						1	Y	
MP_ME_004_015	STAY BOLTS						1	Y	
MP_ME_004_016	TIE BOLTS						1	Y	
MP_ME_004_017	CRANKCASE DOORS & SAFETY DEVICES						1,3	Y	
MP_ME_004_019	MAIN ENGINE TRIAL						2	S	
SF	** SHAFTING **								
SF_SF_001	MAIN THRUST SHAFT AND BEARING						1	Y	
SF_SF_002	INTERMEDIATE SHAFT AND BEARING						1	Y	
ST	*** STEAM SYSTEM ***								
ST_001_001	AUX. BOILER BURN UNIT						-	-	
ST_002_003	COMPOSITE BOILER FEED WATER PUMP AND MOTOR						1	Y	
ST_003_004	HOT WATER CIRCULAR PUMP						1	Y	
ST_004_006	COMPOSITE BOILER F.O. PUMP & MOTOR						1	Y	
ST_004_007	AUX. BOILER D.O. SERVICE PUMP AND MOTOR						1	Y	
ST_008_003	ATMOSPHERE CONDENSER						1	Y	
ST_009	STEAM PIPES, VALVES AND FITTINGS IN ENGINE ROOM						2	Y	

ST_010	OIL PIPES, VALVES AND FITTINGS						2	Y	
ST_011	FEED WATER PIPES, VALVES AND FITTINGS						2	Y	
VT	*** VENTILATION SYSTEM TEST ***								
VT_001	ENGINE ROOM VENTILATOR						1	Y	
VT_003	AUX.E.ROOM FAN						1	Y	
VT_005	CO2 ROOM FAN						1	Y	
VT_007	PURIFIER ROOM EXH. FAN						1	Y	
VT_009	OTHER ROOMS VENTILATOR(STEER. ROOM, EMERG. GEN. ROOM ETC.)						1	Y	

Y - CMS items permissible for the Chief Engineer's inspection, yet to be credited by the surveyor at Confirmatory Survey.

S - CMS items that must be surveyed by the surveyor.

"-" representing *Not Applicable*

Explanatory note on survey methods:

1--Survey method 1: to be abbreviated as O.T. for open and test, that is, to carry out full open-up surveys or partial open-up surveys, if accepted by the surveyor of the CMS items, as well as related function tests and/or hydraulic pressure test (including hydraulic pressure test when the surveyor deems necessary);

2--Survey method 2: to be abbreviated as T for test, that is, to perform function tests of the CMS items.

3--Survey method 3: to be abbreviated as M.V. for measure and verify, that is, to measure and/or verify the CMS items.

1,3--both survey method 1 and 3 are required

2,3--both survey method 2 and 3 are required

"-" representing *Not Applicable*