

GUIDANCE NOTES

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China Classification Society

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

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## **Introduction**

The compilation of the *Guidelines for the Implementation of Continuous Machinery Survey (CMS)* is to aim to provide Ship operators, Chief Engineers onboard 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 ship operators in implementing the CMS System, ensuring that effective cooperation from the ship operators 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".

According to *CCS Rules for Classification of Sea-going Steel Ships* currently in force and feedbacks collected since the implementation of the *Guidelines for the Implementation of Continuous Machinery Survey (CMS), 2013*, an overall revision of the CMS Guidelines 2013 has been carried out and the 2018 version of the CMS Guidelines is therefore developed.

In case of any discrepancy between the provisions of the Guidelines and the latest edition of *CCS Rules for Classification of Sea-going Steel Ships*, the latter shall prevail.

If users of the Guidelines have any comments and suggestions for revision, please send them to [cdwork@ccs.org.cn](mailto:cdwork@ccs.org.cn).

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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 "ship operators") 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 of the relevant provisions of *CCS Rules for Classification of Sea-going Steel Ships*.

#### 1.2 Scope of Application

1.2.1 The Guidelines apply to ships subject to *CCS Rules for Classification of Sea-going Steel Ships* and applying for CMS notation or have already been assigned with the "CMS" machinery notation.

#### 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 *Continuous Machinery Survey (CMS)* is to evenly distribute all items of the special survey of the machinery (including electrical installations) (other than annual survey/intermediate survey/survey of the outside of the ship's bottom and related items which are within the special survey scope, screwshaft and tubeshaft surveys, boiler survey and steam pipe survey and surveys related to class notations for which there's no clear provision that CMS can be performed) into annual surveys within the (5-year) cycle of the special survey as far as practicable, and the longest interval for each item shall not exceed 5 years. All items to be inspected are to be submitted for examination after opening and cleaning, as in the special survey. Control, alarm and safety systems are in general to be checked only by operation test or simulation test. Attention is to be paid to the following when performing CMS:

(1) Ships on which CMS is performed are not exempted from other periodical surveys, that is, CMS cannot completely replace special surveys of the machinery, and the adoption of CMS cannot cancel or change other survey items necessary for maintaining its class, and the items not included in CMS are to be surveyed in compliance with the requirements of Chapter 5 "Surveys after Construction" and Chapter 6 "Surveys related to Class Notations" of PART ONE and PART EIGHT "Additional Requirements" of the Rules for Classification of Sea-going Steel Ships.

(2) For the implementation of CMS on inert gas systems (IGS), please refer to the requirements of Chapter 5 of PART ONE of the Rules for Classification of Sea-going Steel Ships.

(3) For the implementation of CMS on refrigerated cargo installations, please refer to the requirements of Chapter 6 of PART ONE of the Rules for Classification of Sea-going Steel Ships.

(4) For ships assigned with the notation of diesel engine lube oil condition monitoring (ECM), the items included in the lubricating oil analysis, i.e., cylinders, pistons, piston rings, piston rods, piston pins, crossheads, crosshead pins, guides, crankshafts and all bearings, connecting rods, piston rod stuffing boxes, may not be covered in the range of CMS.

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 1 for all applicable survey methods to different CMS items.

1.4.4 How to understand the continuous machinery survey

1.4.4.1 During the process of operating a ship, the crew will keep performing maintenance of the ship continuously. The implementation of CMS is aimed to combine the maintenance of a ship carried out by its crew with all items of the special surveys of machinery (including electrical installations) for which CMS can be carried out as provided by CCS. To this end, the Society has put these CMS items into detailed categories, which, in combination with the practical situations of ship companies, such as ship maintenance, repair, self-repair by the crew, etc. are inspected via an even distribution within the cycle (5 years) 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.

1.4.4.2 In order to successfully implement the CMS, the Ship operator needs to develop a continuous and systematically planned CMS plan, and the attending surveyor shall confirm and/or witness the survey of machinery (including electrical installations) subject to CMS 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 Ship operator to the attending surveyor shall this objective be achieved.

1.4.4.3 At CMS surveys, the conditions of the machinery (including electrical installations) subject to CMS but without witness of the attending surveyor will be judged in combination with the maintenance and repair cycle and according to the survey status of similar machinery (including electrical installations), together with the results of systematic survey records. For this purpose, the Ship operator 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:

- (1) 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.
- (2) If deficiencies are found in machinery installations or components opened up for CMS inspection, if deemed necessary, the attending surveyor may require opened-up survey of

similar machinery (including electrical installations) or their components.

- 1.4.4.4 It should be specially noted that maintenance of some uncommon, special or precise equipment needs support from the manufacturer or a specialized factory. Chief engineer onboard the ship and the maintenance representative of the ship operator should be able to clearly identify the risk of repair of such equipment by themselves.

## **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 Ship operator shall submit an *Request for Survey of ship/unit in service* or *Request for newbuilding ship's services* 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 *Request for Survey* or *Service Agreement on Construction Survey*, 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 Ship operator. 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 the list 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 may issue a Certificate of Classification to the applying ship, assign the CMS notation, and issue a Survey Report to explain at the same time.
- (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 CCS survey unit can issue the Certificate of Classification and assign the CMS notation 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 Ship operator shall submit an *Request for Survey of ship/unit in service* or *Request for newbuilding ship's services* to the survey unit.

Upon receipt of the *Request for Survey of ship/unit in service* or *Request for newbuilding ship's services*, a review will be carried out 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 Section 9 of Chapter 2 of PART ONE 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 at the time of an annual survey.

1.5.8 Cancellation of Class

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

1.5.9 The first cycle of the continuous survey

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 at the time of 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 survey of CMS, 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 or the attending surveyor 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

1.5.10.1 In accordance with the implementation status of CMS, the Society or the Ship operator may terminate CMS and adopt special survey of machinery instead.

(1) Last cycle was a CMS or PMS:

① 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 special survey of hull; 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 the due date of the special survey.

② Where the termination of CMS occurs during the cycle:

First of all, confirmation should be made that the due CMS items have all been inspected satisfactorily and the unfinished CMS 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.

③ It is recommended to apply for termination of CMS in combination with the completion survey of the hull special survey.

(2) Last cycle was a special survey cycle or the first special survey cycle for a new-building ship:

The Ship operator 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 the due date of the special survey.

1.5.10.2 In accordance with the implementation status of CMS, the Ship operator may apply for termination of CMS and adopt PMS instead.

(1) For ships that are operating under CMS system, if the Machinery PMS survey plan can be developed in a reasonable manner, the original CMS items will then be

credited. PMS survey items should completely cover all CMS items, and ensure that the interval between the completion date of the original CMS items and the next maintenance date shall not exceed the PMS survey interval.

(2) For detailed survey requirements on ships' PMS, please refer to Annex 16: *Guidelines for Survey of Planned Maintenance Scheme (PMS) for Machinery* under Chapter 5, PART ONE of the Society's *Rules for Classification of Sea-going Steel Ships*.

- 1.5.10.3 For a Chinese flag ship, if special periodical survey is adopted, the CMS notation should be withdrawn, that is, to terminate the CMS.
- 1.5.10.4 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 Ship operator, as appropriate, requesting for correction within a given period of time; if not corrected, the survey unit may terminate the CMS 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.
- 1.5.10.5 **Reporting after termination and withdrawal of CMS**  
In response to the above-mentioned circumstances, the CMS may be terminated upon completion of the required survey, and the survey unit may issue the 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 Certificate of Classification, and the PMS notation should be assigned. Meanwhile, a Survey Report shall be issued to explain why this is happening.
- 1.5.11 In order to maintain the class, the ship may be laid up; for relevant CMS survey requirements, please refer to relevant requirements of the Society's *Rules for Classification of Sea-going Steel 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. For details, please refer to 1.4.1 of the Guidelines.

##### 2.1.3 Survey cycle of CMS

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

#### 2.2 List of CMS items

See "*Annex 1 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

① Including M/E cylinder cover and its valves and attachments, M/E cylinder liner, M/E pistons, / piston rod/stuffing/sealing, piston pin and its bearing, M/E crosshead and bearing, M/E crosshead guide, M/E connecting rod, crank web deflection measurement, bedplate, crankcase, engine frame, M/E governor, crankcase door fastening and explosion relief devices, scavenging box safety release device, M/E high-pressure fuel pump, electronic **control** injectionsystem, scavenging pump or scavenging fan, turbocharger, intercooler, M/E vibration damper/vibration absorber and balance device, M/E camshaft and their transmitting gear, M/E reversing gear, M/E-driven bilge pump/fuel boost pump/lubricating oil pump/cooling water pump, M/E-drivenlubricating oil and fresh water cooler, M/E foundation bolts and gaskets, M/E starting air pipes and valves, safety and alarmdevices.

② The Chief Engineer may be permitted to carry out inspection of M/E crankshaft, main bearing and crank-pin bearing, and after that a confirmatory survey is to be carried out. However, witness survey for at least two main bearing and crank-pin bearing of main engines are to be carried out with attendance of the Society's surveyor, the selected bearings to be presented for survey chosen from 1 of the 3 aftermost bearings and chosen from 1 other than the 3 aftermost bearings. In any case, the selected bearings to be presented for survey shall alternate to last CSM cycle. The above mentioned can't exclude the requirement of "Items that have been examined by the Chief Engineer at last CMS cycle are to be examined by the surveyor of this Society at this CMS cycle". These items will be marked with "※" in CMSplan and survey status.

###### (2) Electric propulsion installations

Including propulsion motors, the prime mover of propulsion generator, propulsion generator, subsidiary equipment and control units of electric propulsion installations, 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 of gearboxes/thrust shaft/intermediate shaft pedestals.

(4) Auxiliary engines

Including auxiliary diesel engines for generator (main/berthing/emergency), auxiliary diesel engines for important auxiliary machinery installations, steam turbine that drives auxiliary machinery and its components, foundation bolts and gaskets for auxiliary engines, and engine-driven pumps, coolers, intercoolers, filters and safety devices of these auxiliary engines.

(5) Auxiliary machinery

① Air compressors and their prime movers

Including main, auxiliary, control and emergency air compressors and their intercoolers, filters and oil-water separators.

② 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.

③ Heat exchangers

Including condensers, feed water heaters, coolers, oil heaters.

④ Main boiler fresh water generator for driving the main steam turbine.

⑤ Electrical installations

Including all generators, insulation resistance (electric equipment and the circuit), equipment within dangerous zones, main switchboard and its accessories, emergency switchboard and its accessories, distribution boards and their accessories, air circuit breakers of generators, 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.

⑥ Deck machinery

Including steering gear and its hydraulic pumps and/or motors, anchor windlass and machinery (including its hydraulic pump and/or motors), hydraulic pump station.

⑦ Forced and draught fans at engine room and cargo holds.

⑧ 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 valves, cocks and filters of these systems, as well as remote control valves, collision bulkhead valves, and pressure/vacuum valves, pressure vacuum breakers.

⑨ Refrigerated cargo installations

Including reciprocating refrigeration compressors, rotary screw compressors, refrigerant condenser cooling pumps, refrigerant circulation pumps, brine circulating pumps, refrigerant pressure vessels and heat exchangers, cooling fans, refrigerant piping/valves/accessories, automatic controls and alarms for refrigerated installations.

⑩ Approved inert gas system

Including:

- a. inert gas piping system, valves and accessories (cargo areas)
- b. flue gas and inert gas generator system  
flue gas type inert gas generator, fuel oil type inert gas generator, inert gas distribution piping and stop valves (including air intake valves, soot blower interlock device, etc.), inert gas fan, scrubber, cooling and scrubbing water pump, cooling and scrubbing water piping/valves/accessories, deck water seal, seal water pumps, seal water piping/valves/accessories, double block and bleed arrangement, deck mechanical non-return valve.
- c. nitrogen gas generation system  
air compressor, feed air processing system, nitrogen generator, nitrogen receiver or buffer tank
- d. all automatic closing devices and alarms.

⑪ Additional requirements for ships with machinery automation notation

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

⑫ 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) Main steam turbine (full set).
- (2) Main gas turbine (full set).
- (3) Gearbox, shafting flexible coupling and clutches.
- (4) Steam turbine that drives generator and its components.
- (5) 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.
- (6) Test of M/E operation and initial starting arrangement.
- (7) Air bottles (applicable to air bottles with a working pressure of 0.7 MPa and over).  
Including main air vessel, auxiliary air vessel, control air vessel, emergency air vessel.
- (8) Damage, repair and alteration of machinery installations.

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

For example:

- (1) Annual surveys, intermediate surveys, surveys related to class notations for which there's no clear provision that CMS can be performed;
- (2) Propeller shaft and its bearing, stern tube shaft and its bearing, directional propeller device, water jet propulsion unit, and etc.;
- (3) Propeller ( full set);
- (4) 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);
- (5) 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

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

Relevant key points should also be taken into full account by the Ship operator 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:

- ① Survey items such as crankshaft, main bearing, bottom end (crankpin) bearing of connecting rod, etc., taking into account of the situations described in 2.2.1(1) ②;
- ② 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;
- ③ 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) Cargo refrigeration compressor.

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 Ship operator 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.

(5) It is suggested that prime movers of the generator set, generators, engine-driven pumps/coolers/intercoolers/filters/oil-water separators/safety devices of prime movers, and the generator system and power station automation system and alarms be surveyed together. For prime movers of a generator set, especially the prime movers of a large generator set of electric propulsion ship, continuous survey according to the components may be an option, on this occasion, surveys of the generator system and power station automation system and alarms may be completed in conjunction with special surveys.

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 screwshaft and tub shafts as possible.

2.3.4 The 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 ships in service that have implemented CMS system
  - ① The Ship operator may develop CMS plan based on the aforesaid principles and in combination with the company's maintenance procedures.
  - ② In the first CMS cycle, the due date of all CMS items may also be scheduled at the due date of special survey of hull, following which the Ship operator 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) Ships in service that start implementation of CMS system between two special surveys  
The 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 according to the CMS plan developed.
- (3) Ships in service with transfer of class into CCS from societies accepted by CCS
  - ① Where the ship has adopted CMS for machinery (including electrical installations) at the previous classification society, then after transfer into CCS class, the Ship operator 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 CMS 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 as soon as possible so as to be completed no later than the due date of this cycle after consultation from the surveyor with the Ship operator.
  - ② Where the ship has not adopted CMS for machinery (including electrical installations) at the previous classification society, the Ship operator may also apply for CMS according to the requirements of the Guidelines.
  - ③ Where the previous classification society has implemented CMS and the Ship operator 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) Ships in service that implemented PMS in the previous cycle  
The survey unit shall review all PMS survey items in accordance with the PMS plan and each historic PMS survey reports (within one PMS survey circle), confirming that all due PMS survey items have been inspected before direct reinstatement of the CMS survey, 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 *Guidelines for Ships' Machinery Planned Maintenance System (PMS)*.

## 2.4 Initial development of CMS plan

The Ship operator 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 their components, 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 Ship operator.

2.4.2 The Ship operator 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 exactitude of the ship's machinery (including electrical 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 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, the surveyor should check that the CMS items not permissible for the Chief Engineer's inspection (the CMS items that must be inspected with the attendance with the Society's surveyor) have been marked as "S" by the system.
- 2.5.3 A CMS plan (Form PLAN/CMS) that is developed initially 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, and it shall not be replaced along with the completion survey of CMS. The surveyor does not need to sign off each completed survey item in the CMS plan.
- 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 Ship operator 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 state. For control, alarm and safety 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 In combination with any onboard survey, the surveyor shall inspect CMS items requested by the ship operator or Chief Engineer, including items which have been completed ahead of schedule. For due or overdue CMS items, the Ship operator or Chief Engineer need to be clearly informed that such items must be handled during annual survey, and be advised to pay attention to extensions mentioned in 3.1.9(4). For the first CMS cycle, during surveys, the ship is to be especially reminded to pay attention to the requirements of evenly distributing CMS items into annual survey within the (5-year) cycle of the special survey as far as possible, and the survey is to be carried out on CMS items requested by the Ship operator and Chief Engineer.
- 3.1.4 All due or overdue continuous survey items should be completed at the annual survey.
- (1) 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.
  - (2) 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.
- 3.1.5 For CMS items permissible for the Chief Engineer's inspection by the Society, please refer to section 2.2.1 and Annex 1 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.
- 3.1.6 For CMS items not permissible for the Chief Engineer's inspection (CMS items which must be witnessed with the attendance of the surveyor of the Society), the Ship operator 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 permissible for the Chief Engineer's inspection and having already been inspected by the Chief Engineer during the previous CMS survey cycle, relevant CMS items will be marked from "blank space" to "CE" in the ship survey information management system, indicating that such CMS items have already been inspected by the Chief Engineer. During this CMS survey cycle, the surveyor of the Society will carry out witness survey on these items, and relevant CMS items shall be marked from "CE" to "blank space" 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 Ship operator. The next survey date may be estimated from the completion 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 internal memo also being given. Extension surveys include check of maintenance or repair record, visual surveys of equipment and/or 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 Ship operator 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.
  - (4) Notwithstanding the above requirements, considering special requirements of inspection from certain industrial organizations, when performing a survey other than annual survey, intermediate survey or special survey, if the checklist indicates that the CMS items will be due, is due or overdue, it is recommended that the Ship operator may consider extension as appropriate. Upon approval of a 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 (the maximum interval after extension should not exceed 15 months, but should not exceed the due date of special survey of hull), with the internal memo provided. Upon completion of survey of the extended CMS items, the new due date should still be calculated starting from the original due date. Extension exceeding the due date of special survey of hull is to be handled according to above mentioned (3).
- 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, as appropriate, may be granted, requiring repair within a definite time.
- 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 attention shall be paid to verify the "*Continuous Machinery Survey Report*" (Form CMc (PC/M)) and ship survey status in this continuous survey cycle, validating that all survey items in the CMS plan have been closed. For special survey of hull carried out stepwise, all CMS items may be done at the beginning of special survey of hull or in combination with special survey of docking step-by-step, i.e. CMS items may be completed within 15 months prior to the due date of the Certificate of Classification. At this time, only CMS is carried out, while the completion survey of CMS

is still to be carried out until the Certificate of Classification expires. When completion survey of CMS is carried out, it is to be specially noted that the randomly inspected main engine crankshaft, main bearing and crank pin bearing as mentioned in 2.2.1(1)② are in compliance with relevant requirements.

- 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 issued to explain the reason, as changes without approval of the Society may affect the validity of the class.

### **3.2 Preparations of the Ship operator and Chief Engineer during the survey of CMS items permissible for the Chief Engineer's inspection by the Society**

- 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 1 of the Guidelines.
- 3.2.2 Attention is to be paid to the following when the Chief Engineer implements the survey of CMS items permissible by the Society:
  - 3.2.2.1 Upon completion of CMS items permissible for the Chief Engineer's inspection by the Society, it is the responsibility of the ship operator to arrange for the surveyor to carry out a confirmatory survey. The ship operator shall apply for the confirmatory survey at next ship survey, while the Chief Engineer shall submit the survey report.
  - 3.2.2.2 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 Ship operator'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.
  - 3.2.2.3 For CMS items permissible for the Chief Engineer's inspection, the Chief Engineer should maintain relevant records in engine log book, maintenance history and wear measurement 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 check.
  - 3.2.2.4 The ship operator shall make sure that the Chief Engineer inspecting the CMS items is competent for the maintenance of items related to classification. The Chief Engineer shall 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.
  - 3.2.2.5 The Chief Engineer must prepare two signed copies of the Chief Engineer's Report to Continuous (Form PC/CE) by himself, with one copy kept on board and the other one submitted to the surveyor for confirmatory survey, of which the supplement sheet is only for check by the surveyor on board and need not be submitted to the surveyor. The Chief Engineer's Report For Continuous Machinery Survey (Form PC/CE) shall include:
    - (1)Ship's name, Class number, flag state, port of registry, the ship owner or ship operator;

- (2) Name of the Chief Engineer and particulars of Chief Engineer's License of Competence;
  - (3) Survey items, date of examination and place of examination of the CMS items;
  - (4) 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;
  - (5) Detailed descriptions shall be made on survey findings and technical state, as well as the operational states before and after inspection;
  - (6) Detailed descriptions must be made on replaced/repared parts, and the replaced parts must be kept on board or photographed for future inspection;
  - (7) The inspection process should be photographed for records as far as practicable.
- 3.2.3 The Ship operator must direct the Chief Engineer on-board the ship to carry out the survey of CMS items. Examples of surveys of some common machinery equipment are given below, which is only for reference and the requirements of equipment specifications shall prevail.
- 3.2.3.1 Main propulsion diesel engine
- (1) Confirming that the dedicated tools, measuring devices and spare parts required in the open up inspection of main propulsion diesel engines are properly prepared;
  - (2) Confirming that the open up inspection of main propulsion diesel engines is not affected by water flow and will not cause rotation affecting open up inspection;
  - (3) Cylinder liners, cylinder covers and their accessories, pistons and piston rings must be fully opened up for careful inspection, cylinder liners must be measured and the wear measurements shall be recorded;
  - (4) The top and lower halves of main bearings shall be opened up to measure bearing clearance, record data and compare with limit data recommended by the engine manufacturer;
  - (5) The top and lower halves of bottom end (crankpin) bearing of connecting rod shall be opened up to measure bearing clearance, record data and compare with limit data recommended by the engine manufacturer, and confirm that the service time of connecting rod bolts has been verified and recorded;
  - (6) Piston pin, upper end bearing of the connecting rod or crosshead and its bearing halves shall be opened up to measure bearing clearance, record data and compare with limit data recommended by the engine manufacturer;
  - (7) Crank pins, main journals and crank webs shall be inspected carefully to confirm whether there are cracks specially at the fillet and in the vicinity of lubricating oil holes;
  - (8) The crank web deflection shall be measured and recorded periodically so that when the data is submitted to the surveyor of the classification society, variation trend can be confirmed and the journals shall be supported firmly on the bearing during the relevant operation;
  - (9) Attention shall be paid to the following during bearing inspection:
    - ① Confirming that the oil sample analysis report is normal;
    - ② Confirming that the crankcase is clean without foreign material;
    - ③ Checking bearing edges to confirm that there is no defect affecting establishment of oil wedge;
    - ④ If the alignment or bearing wear is normal, the lower halves of the main bearing may usually not be opened up for inspection;
  - (10) Other accessories liable to wear or failure shall be inspected carefully and recorded;
  - (11) Fasteners and explosion relief devices of crankcase doors shall be inspected carefully;
  - (12) Main engine foundation bolts shall be subject to visual inspection and knock inspection;

- (13) Any damage, deficiency or malfunction that may result in invalidation of class shall be immediately reported to the Society;
- (14) The safety devices, remote control systems and automatic alarm devices of all main propulsion diesel engines must be verified in good condition at work;
- (15) The diesel engine shall be subject to running test after open up inspection.

#### 3.2.3.2 Auxiliary diesel engine

- (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) Confirming 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 relief 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. For diesel engine of abnormal structure, its specific open up procedure is to be followed by referring to the above requirements;
- (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) Intercooler, lubricating oil cooler, fresh water cooler, filter and oily water separator shall 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;

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, a request 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.

#### 3.2.3.3 Reciprocating compressor

- (1) Pistons and valves shall be opened up for careful inspection;
- (2) Cooling water jacket space shall be inspected and tested, and pressure test shall be carried out if corrosion is found or after damage repair;
- (3) Relief valves shall be checked after replacement.

- 3.2.3.4 Cooler, condenser and heater
- (1) The shell shall be opened up for careful inspection;
  - (2) The tube bundle shall be subject to inspection;
  - (3) The relief valves shall be checked in service condition;
  - (4) Pressure test shall be carried out if corrosion is found or after damage repair;
- 3.2.3.5 Electric switchboard
- (1) Checking clean condition of switchboard;
  - (2) Confirming tightening status of connecting accessories, locking device and busbar;
  - (3) Checking condition of circuit breaker, switch and fuse;
  - (4) Checking measuring instruments, which are to be re-calibrated or replaced if not accurate.
- 3.2.3.6 AC or DC generator
- (1) Removing protection plate and electric brush holder;
  - (2) Cleaning excitation coil and armature winding;
  - (3) Confirming that the electric brush can touch properly, and replacement shall be carried out in case of excessive wear;
  - (4) Checking the commutator and sliding spring;
  - (5) Measuring air gap clearance;
  - (6) Checking journal and bearing;
  - (7) Checking insulation resistance.
- 3.2.3.7 Other items (pump and motor)
- In general, main parts liable to wear or failure shall be subject to open up inspection, e.g. bearing, shell, impeller and rotor.
- 3.2.3.8 Detailed requirements for survey methods of CMS items and precautions are provided in Annex 1 of the Guidelines, which may be considered by the ship operator as guidance for the Chief Engineer.

### **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 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) submitted by the Chief Engineer to credit the completion of relevant survey items of CMS.
  - (2) 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 1 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, if deemed necessary, 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 calculated from the original due date; if the completion date is more than three months before the original due date, the next due date shall be calculated from the completion date.
  - (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 calculated from the original due date; 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 calculated from the completion date of inspection by the Chief Engineer.
  - (3) For the first cycle of continuous survey, the next survey date shall be calculated from the completion date of the survey.
- 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, of which the supplement sheet is only for check by the surveyor on board and need not be submitted to the surveyor.
- 3.4.4.2 Preparation and distribution of *Continuous Machinery Survey Report (Form CMc (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. For CMS items inspected by the Chief Engineer, the surveyor, upon completion of confirmatory survey, should mark relevant CMS items from "blank space" to "CE" in the Ship Survey Information Management System. After witness survey of CMS items marked with "CE" is carried out by the surveyor of the Society, relevant CMS items shall be marked from "CE" to "blank space".
  - (3) Upon entry of relevant information, the *Continuous Machinery Survey Report* (Form CMc (PC/M)) will be automatically generated and filed according to the requirements of the documented procedures.

## 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 Ship operator 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 CMS items**

Upon completion of CMS items, information of CMS items inspected in this survey shall be uploaded into the database of the Society's Ship Survey Information Management System according to the time specified in the documented procedures.

## **Chapter 5 Annexes**

### **5 Annexes**

5.1 Annex 1: List of CMS Items and Methods of Witness Survey

5.2 Annex 2: Report to Continuous Machinery Survey (for Chief Engineer only) (Form PC/CE)

5.3 Annex 3: Sample of CMS Plan (oil tanker)

**Annex 1 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
M/E piston pins and their bearings	Y	1
M/E crossheads, crosshead bearings, guides	Y	1
M/E connecting rods	Y	1
M/E crankshafts and all bearings※	Y	1 Note 1: If the alignment or bearing wear is normal, the lower halves of the main 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 relief devices	Y	1, 3
Scavenging box safety release devices	Y	1, 3
M/E high-pressure fuel pumps	Y	1
electronic fuel injection system	Y	1
Scavenging pump or scavenging fan	Y	1
Turbochargers	Y	1

Intercoolers	Y	1
M/E torsional vibration dampers/detuners and balance devices	Y	1
M/E camshaft and their transmitting gear	Y	1
M/E reversing gears	Y	1
M/E attached bilge pumps, fuel oil booster pump, L.O. pumps, cooling water pumps	Y	1
M/E attached 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.
Safety protection devices	Y	2
Alarms	Y	2
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 1: Reference can be made to 5.9.4.8, Chapter 5, PART ONE of the <i>Rules for Classification of Sea-going Steel Ships</i> of the Society; Note 2: Reference can be made to 5.9.4.8, Chapter 5, PART ONE of the <i>Rules for Classification of Sea-going Steel Ships</i> of the Society for the provisions on waiving of lifting of the main steam turbine casing for inspection.
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
All ancillary equipment and control units of electric propulsion installations	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 gear boxes 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 their pinions and wheels, shafts, bearings, thrust shafts, thrust bearings, lubrication systems and etc. are working in normal condition.  Note 2: Conventional gear units 1,120 kW and below and all epicyclic gear units need not be opened up provided that satisfactory operating records are provided by the owner.
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>		Note: Their engine-driven pumps, coolers, intercoolers, filters, oil-water separators, safety devices, and the generator system and power station automation system should be inspected together with the following items. For prime movers of a generator set, especially the prime movers of a large generator set of a electric propulsion ship, continuous survey according to the components may be an option. On this occasion, surveys of the generator system and power station automation system and alarms may be completed in conjunction with special surveys.
Auxiliary diesel engines for power generation including pumps driven by them (main/ harbor /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.
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 Note 1: In case of any corrosion or damage is found, hydraulic pressure test should be carried out to determine its working pressure.  Note 2: Their relief valves are to be checked in service conditions. If it is difficult to open up certain small 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.
Auxiliary air vessels	S	
Control air vessels	S	
Emergency air vessels	S	
<b>8. Auxiliary machinery</b>		
<b>a. Air compressors</b>		
Main air compressors	Y	1 Note 1: Including the inspection of prime movers. In case of motors, they should be examined together with their auxiliary control and operating mechanisms, and insulation resistance
Auxiliary air compressors	Y	
Control air compressors	Y	

Emergency air compressors	Y	records are to also be submitted. Note 2: Their intercoolers, filters and oil-water separators and safety devices are to be examined together.
<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 booster pump, 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, condensate pumps, 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 pressure.
Coolers 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	Y	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 with working pressures of 0.7 MPa and over, an alternative hydraulic test to 1.25 times the working pressure may be accepted.
Oil heaters Fuel oil heaters, L.O. heaters	Y	
<b>d. Main boiler fresh water generators for driving the main steam turbine</b>	Y	1

<b>e. Electrical installations</b>		
All generators	Y	1 Note: Relevant tests must be witnessed by the attending surveyor and, if necessary, a full load test may be required;
Generator parallel operation, load distribution and shutoff	S	2; Relevant tests must be witnessed by the attending surveyor
Insulation resistance (electrical equipment and circuits)	Y	3 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, attention should be paid to whether the existing conditions meet the relevant operational requirements. In cases where a proper record of testing is maintained, consideration should be given to accepting recent readings. Note 2: It is recommended that ship operators to maintain insulation resistance records of periodical measurement, so as to be submitted to the surveyor for inspection.
Equipment within dangerous zones	Y	General inspection 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, etc.
Main switchboard, emergency switchboard, distribution boards and their attachments	Y	2, 3 Note: Inspect and test overcurrent protection and fuse box
Air circuit breaker of the generators (main switch)	S	1, 3; Note: Test to verify its protection devices, including overcurrent (long-time and short-time delay), under voltage, reverse-power, and etc.

All cables	Y	2 Note 1: Confirm that fittings and protective covers are not loose. 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.
Wet-type transformers of essential power supply	Y	1 Note: The ship operator 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.
Emergency power source together with its automatic device and auxiliary power source, including uninterrupted power supply (UPS) for automation system	Y	2
Main lighting, emergency lighting, temporary emergency lighting, additional lighting	Y	2
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	Y	2
<b>f. Deck machinery</b>		
Steering gear (including their hydraulic pumps or motors)	Y	1 Note 1: The system safety valves, pressure release valves are to be tested and checked their setting, and if necessary, a full-load test of steering motors may be required. Note 2: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted.

Anchor windlass and machinery (including their hydraulic pumps or motors)	Y	1 Note 1: Carrying out operation test, checking the brake and foundation, and testing of safety devices. Note 2: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted.
Hydraulic pump station		Note 1: 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>g. Forced and draught fans at engine room and cargo holds</b>	Y	1
<b>h. Piping, valves and accessories</b>		
Compressed air piping and its valves, cocks and filters	Y	2 Note 1: 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	Note 2: Connection and blanking arrangements of the systems are to be examined or tested and if necessary opened up for examination.
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
Pressure vacuum breaker	Y	1, 3
<b>i. Refrigerated cargo installations</b> , including		Note: Examination of refrigerated cargo tanks as required in the <i>Rules for Classification of Sea-going Steel Ships</i> is not within the scope of CMS.
Reciprocating refrigeration compressors	Y	1 Note 1: Including the inspection of prime movers. In case of motors, they should be examined together with their auxiliary control and operating mechanisms, and insulation resistance records are to also be submitted. Note 2: Crankcase glands and the lower halves of main bearings need not be exposed for examination provided that the Surveyor is satisfied as to the alignment and wear.
Rotary screw compressors	Y	1 Note 1: Including the inspection of prime movers. In case of motors, they should be examined together with their auxiliary control and operating mechanisms, and insulation resistance records are to also be submitted.

Refrigerant condenser cooling pumps	Y	1 Note 1: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted.
Refrigerant circulation pumps	Y	1 Note 1: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted. Note 2: Special consideration may be given to survey requirements for refrigerant circulating pumps of the hermetically sealed type.
Brine pumps	Y	1 Note 1: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted.

<p>Refrigerant pressure vessels and heat exchangers</p> <p>Refrigerant condensers, refrigerant evaporators (brine coolers), separators, receivers, driers, filters and other pressure vessels</p>	<p>Y</p>	<p>1</p> <p>Note 1: In the case of pressure vessels covered by insulation, any evidence of dampness or deterioration of the insulation which could lead to external corrosion of the vessels or their connections is to be investigated, special attention should be paid.</p> <p>Note 2: In the case of pressure vessels covered by insulation, when in doubt, sufficient insulation is to be stripped from insulated pressure vessels to permit the condition of the vessels to be ascertained. Care is to be taken that in replacement of the insulation, the vapour sealing of the outer covering is made good.</p> <p>Note 3: Where corrosion or damage is found, pressure test is to be carried out to determine the working pressure.</p> <p>Note 4: Additional requirements of the second and subsequent special surveys:</p> <p>① Gas condensers of the shell-and-tube type, and gas evaporators (brine coolers) of the shell-and-tube type in which refrigerant is in the shell, are to have the water or brine end covers removed and the shell pneumatically tested with the refrigerant or air, or a mixture of inert gas and refrigerant, to the pressures as required in Table 2.1.4.1 of Chapter 2, PART FIVE of the <i>Rules for Classification of Sea-going Steel Ships</i>, depending on the different refrigerants used.</p> <p>② Gas evaporators (brine coolers) of the shell-and-tube type in which the refrigerant is in coil, are to have the refrigerant end covers removed and the shell hydraulically tested to 1.5 times the designed pressure, but not less than 0.34 MPa.</p> <p>③ Heat exchangers used for cooling refrigerant liquid would normally require to be specially examined internally only if leakage is suspected between high and low pressure sides. This type of heat exchangers is to be examined and tested at the discretion of the Surveyor according to the design of such equipment.</p>
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Cooling fans	Y	1 Note 1: Motors and their auxiliary control and operating mechanisms for essential services are to be examined, and insulation resistance records are to also be submitted.
Refrigerant piping, valves and accessories	Y	1 Note 1: Opening the valves for examination if necessary. Note 2: Confirming that all pressure relief valves and safety discs throughout the refrigerating plant are in good order. However, no attempt is to be made to test refrigerant pressure relief valves on board. Note 3: Sea connections to refrigerant condensers are to be opened out and examined at the hull special survey.
Automatic controls and alarms for refrigerated installations	Y	2
<b>j. Approved inert gas system</b>		
<b>Inert gas piping system</b>	Y	1
<b>Flue gas and inert gas generator system</b>		
•Flue gas type inert gas generator	Y	2 Normally auxiliary boilers; only related to inspection of quality of the generation of inert gas
•Fuel oil type inert gas generators	Y	1
•Inert gas distribution pipes and stop valves, including i air inflation valves, soot blower interlock devices	Y	1
•Inert gas fans	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.

•Scrubbers	Y	1 Note: confirming whether there are traces of gas or effluent leakage
•Cooling and scrubbing water pump	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.
•Cooling and scrubbing water piping, valves and accessories	Y	1 Note: Valves are normally to be inspected in open up condition. Special attention is to be given to the examination of outflow pipes, overboard discharge pipes and valves. Examination of overboard valves will be carried out in conjunction with in-dock surveys.
•Deck water seal	Y	1
•Double block and bleed arrangement	Y	1
•Deck mechanical non-return valves.	Y	1
•Seal water 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.
•Seal water piping, valves and accessories,	Y	1 Note: Valves are normally to be inspected in open up condition. Special attention is to be given to the examination of outflow pipes, overboard discharge pipes and valves. Examination of overboard valves will be carried out in conjunction with in-dock surveys.
<b>Nitrogen gas generation system</b>	Y	1

•Air compressor	Y	1 Note 1: Including the inspection of prime movers. In case of motors, they should be examined together with their auxiliary control and operating mechanisms, and insulation resistance records are to also be submitted.
•Feed air supply processing system	Y	1
•Nitrogen generator	Y	1
•Nitrogen receiver or buffer tank	Y	1
※ All automatic closing devices and alarms	Y	2
<b>k. Additional requirements for ships with machinery automation notation</b>		
Automated system of main propulsion machinery: 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); b. control system changeover and communication; c. safety system; d. alarm system; e. overriding control system; f. automatic start of standby machinery; g. confirming changeover to manual control in case of failure of remote control system; h. function test of control, safety and alarm systems when power (electrical, hydraulic or pneumatic) is restored after a power failure.	Y	2 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. Note 2: It is recommended that the ship owner should maintain a. records of periodical inspection and calibration of alarm points; b. records of on-board machinery and equipment safety protection device tests.
Local control station, engine room centralized control station, bridge control station:	Y	

M/E oil mist detectors:	Y	
Automated system of boilers (including thermal oil heaters), including: a. safety system for burning (including automatically stopping fuel supply pump, automatically starting and stopping feed pump, scavenging, automatically controlling temperature); b. monitoring and alarm systems; c. manual control.	Y	
Automatic controls and alarms of generating system and power plant, including: Automatic start, switch-in, parallel operation, load distribution and shutoff of generators including 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>1. 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
<p>Y - surveyable CMS items by Chief Engineers, yet to be credited by a Surveyor in the Confirmatory Survey.</p> <p>CE - For CMS items permissible for the Chief Engineer’s inspection and having already been inspected by the Chief Engineer during the previous CMS survey cycle, they will be marked from “blank space” to "CE" in the ship survey information management system, indicating that such CMS items have already been inspected by the Chief Engineer. During this CMS cycle, the surveyor of the Society will carry out witness survey to these items, and relevant CMS items are to be marked from "CE" to “blank space” upon completion of survey.</p> <p>※ - Surveyable CMS items by Chief Engineers, yet to be credited by a Surveyor in the Confirmatory Survey. However, witness survey for at least two main bearing and crank-pin bearing of main engines are to be carried out with attendance of the Society's surveyor, with the selected bearings to be presented for survey chosen from 1 of the 3 aftermost bearings and chosen from 1 other than the 3 aftermost bearings. In any case, the selected bearings to be presented for survey shall alternate to last CSM cycle. The above mentioned can't exclude the requirement of “Items that have been examined by the Chief Engineer at last CMS cycle are to be examined by the surveyor of this Society at this CMS cycle”.</p> <p>S - CMS items that must be surveyed by a Surveyor.</p>		
<p>▲Methods used by surveyors at witness surveys of CMS items:</p> <ol style="list-style-type: none"> <li>1) <b>Survey method 1:</b> 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).</li> <li>2) <b>Survey method 2:</b> to perform function tests of the CMS items.</li> <li>3) <b>Survey method 3:</b> to perform measurement and/or adjusting of the CMS items.</li> </ol>		

**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，轮机长完成项目的检查结果应记录在本报告中。

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 in this report.

- 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,轮机循环检验报告附页仅供验船师船上核查,不必提交验船师。

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. The supplement of the CMS report is only for onboard check by the Surveyor and need not be submitted to the Surveyor.

- 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 **Guidelines for the Implementation of Continuous Machinery Survey (CMS)** of this society.

轮机长签名

Signature of Chief Engineer: \_\_\_\_\_

确认检验:

Confirmatory Survey:

Place: \_\_\_\_\_

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》第 1 篇第 2 章第 9 节的有关规定, 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 Section 9, Chapter 2 of this PART 1 in present Rules for Classification of Sea Going Steel Ships, the vessel's class might be suspended if any continuous survey item due or overdue at time of annual survey has not been dealt with, and no extension is granted by CCS at the time of an 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 **Guidelines for the Implementation of Continuous Machinery Survey (CMS)** of this society.
- 4) 至少各两道主机主轴承和曲柄销轴承应由本社验船师现场见证检验, 所选择的轴承分别为从最后端 3 道轴承中挑选一道以及从最后端 3 道轴承以外的轴承中选取。无论如何, 选取的轴承应与上一周期轮机循环检验不同。前述要求并不能排除“上一个 CMS 周期内已由轮机长检验过的项目, 在本次 CMS 周期内, 将由本社验船师对其进行检验”的执行。  
Witness survey for at least two main bearing and crank-pin bearing of main engines are to be carried out with attendance of the Society's surveyor, with the selected bearings to be presented for survey chosen from 1 of the 3 aftermost bearings and chosen from 1 other than the 3 aftermost bearings. in any case, the selected bearings to be presented for survey chosen shall alternate to last CSM cycle. The above mentioned can't be excluded the requirement of “Items that have been examined by the Chief Engineer at last CMS cycle are to be examined by the surveyor of this Society at this CMS cycle”.
- 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 3 Sample of CMS Plan (oil tanker)**

**Form :PLAN/CMS**



**CHINA CLASSIFICATION SOCIETY**

**PLAN FOR CONTINUOUS SURVEY ITEMS**

Name of Ship	_____ <b>TEST</b> _____	Flag	_____ <b>TEST</b> _____
IMO No.	_____ <b>TEST</b> _____	Class No.	_____ <b>TEST</b> _____

**INSTRUCTIONS**

- I、 Method Instruction:
  - Method 1: Use the acronym O.T., for open and test, to survey the CMS items completely or partly with the surveyor’s approval through making the relative functional testing or/and pressure testing (including necessary pressure testing that surveyor deemed).
  - Method 2: Use the acronym T, for test, to test the CMS items about function.
  - Method 3: Use the acronym M.V., for measure and verify, to measure and/or verify CMS items.
  - Method 1&3: Both of method 1 and method 3 need to be proceeded.
  - Method 2&3: Both of method 2 and method 3 need to be proceeded.
  - “-” represents N.A. (not applicable).
- II、 Note:
  - Y: Allow inspection by Chief Engineer, with follow-up confirmatory survey carried out by surveyor.
  - S: To be inspected by surveyors all the time.
  - ※: At least two marked bearings of each type are to be inspected by surveyors, with one selected from the 3 aftermost bearings and one selected from the others. And the selected bearings should differ from those chosen in last CMS cycle.

NO	Code	Item	JOB No.	Last Due Date	Credited Date	Postponed till	Next Due Date	Method	C.E.
1	<b>CMS 1</b>	<b>Main Propulsion System</b>							
2	<b>CMS 1.1</b>	<b>Main Diesel Engine</b>							
3	<b>CMS 1.1.1</b>	<b>General Item for Main Diesel Engine</b>							
4	CMS 1.1.1.1	No.1 M.E. supercharger (No.1 M.E.)						1	Y
5	CMS 1.1.1.1	No.2 M.E. supercharger (No.1 M.E.)						1	Y
6	CMS 1.1.1.2	No.1 M.E. Emergency Blower (No.1 M.E.)						1	Y
7	CMS 1.1.1.2	No.2 M.E. Emergency Blower (No.1 M.E.)						1	Y
8	CMS 1.1.1.3	Vibration Damper (No.1 M.E.)						1	Y
9	CMS 1.1.1.4	Turning Gear (No.1 M.E.)						1	Y
10	CMS 1.1.1.5	Reversing Gear (No.1 M.E.)						1	Y
11	CMS 1.1.1.6	Starting Gear (No.1 M.E.)						1	Y
12	CMS 1.1.1.7	Maneuvering Gear (No.1 M.E.)						1	Y
13	CMS 1.1.1.8	Hydraulic Pump for Exhaust Valve (No.1 M.E.)						1	Y
14	CMS 1.1.1.9	Balancing Gear (No.1 M.E.)						1	Y
15	CMS 1.1.1.12	Control, Alarm and Safety Devices (No.1 M.E.)						2	Y
16	CMS 1.1.1.13	Air cooler (No.1 M.E.)						1	Y
17	CMS 1.1.1.16	M.E. Governor (No. 1 M.E.)						1	Y
18	CMS 1.1.1.17	M/E starting air pipes and valves						1	Y
19	CMS 1.1.1.18	Testing of initial starting arrangement						2	S
20	CMS 1.1.1.19	Operation testing of main diesel engine						2	S
21	<b>CMS 1.1.2</b>	<b>No.1 MAIN DIESEL ENGINE (CROSSHEAD INLINE)</b>							
22	CMS 1.1.2.1	No.1 Cylinder Cover and Valves (No.1 M.E.)						1	Y
23	CMS 1.1.2.1	No.2 Cylinder Cover and Valves (No.1 M.E.)						1	Y
24	CMS 1.1.2.1	No.3 Cylinder Cover and Valves (No.1 M.E.)						1	Y
25	CMS 1.1.2.1	No.4 Cylinder Cover and Valves (No.1 M.E.)						1	Y
26	CMS 1.1.2.1	No.5 Cylinder Cover and Valves (No.1 M.E.)						1	Y
27	CMS 1.1.2.1	No.6 Cylinder Cover and Valves (No.1 M.E.)						1	Y
28	CMS 1.1.2.2	No. 1 Piston, Piston Rod (No.1 M.E.)						1	Y
29	CMS 1.1.2.2	No. 2 Piston, Piston Rod (No.1 M.E.)						1	Y

30	CMS 1.1.2.2	No. 3 Piston, Piston Rod (No.1 M.E.)						1	Y
31	CMS 1.1.2.2	No. 4 Piston, Piston Rod (No.1 M.E.)						1	Y
32	CMS 1.1.2.2	No. 5 Piston, Piston Rod (No.1 M.E.)						1	Y
33	CMS 1.1.2.2	No. 6 Piston, Piston Rod (No.1 M.E.)						1	Y
34	CMS 1.1.2.3	No.1 Cylinder Liner (No.1 M.E.)						1	Y
35	CMS 1.1.2.3	No.2 Cylinder Liner (No.1 M.E.)						1	Y
36	CMS 1.1.2.3	No.3 Cylinder Liner (No.1 M.E.)						1	Y
37	CMS 1.1.2.3	No.4 Cylinder Liner (No.1 M.E.)						1	Y
38	CMS 1.1.2.3	No.5 Cylinder Liner (No.1 M.E.)						1	Y
39	CMS 1.1.2.3	No.6 Cylinder Liner (No.1 M.E.)						1	Y
40	CMS 1.1.2.4	No.1 Conn. Rod, Crosshead Pin and Bearing and Guides (No.1 M.E.)						1	Y
41	CMS 1.1.2.4	No.2 Conn. Rod, Crosshead Pin and Bearing and Guides (No.1 M.E.)						1	Y
42	CMS 1.1.2.4	No.3 Conn. Rod, Crosshead Pin and Bearing and Guides (No.1 M.E.)						1	Y
43	CMS 1.1.2.4	No.4 Conn. Rod, Crosshead Pin and Bearing and Guides (No.1 M.E.)						1	Y
44	CMS 1.1.2.4	No.5 Conn. Rod, Crosshead Pin and Bearing and Guides (No.1 M.E.)						1	Y
45	CMS 1.1.2.4	No.6 Conn. Rod, Crosshead Pin and Bearing and Guides (No.1 M.E.)						1	Y
46	CMS 1.1.2.5	※No.1 Crankpin, Bottom End Bearing and Webs (No.1 M.E.)						1	Y
47	CMS 1.1.2.5	※No.2 Crankpin, Bottom End Bearing and Webs (No.1 M.E.)						1	Y
48	CMS 1.1.2.5	※No.3 Crankpin, Bottom End Bearing and Webs (No.1 M.E.)						1	Y
49	CMS 1.1.2.5	※No.4 Crankpin, Bottom End Bearing and Webs (No.1 M.E.)						1	Y
50	CMS 1.1.2.5	※No.5 Crankpin, Bottom End Bearing and Webs (No.1 M.E.)						1	Y
51	CMS 1.1.2.5	※No.6 Crankpin, Bottom End Bearing and Webs (No.1 M.E.)						1	Y
52	CMS 1.1.2.6	Fuel injection Pumps (No.1 M.E.)						1	Y
53	CMS 1.1.2.7	Fuel injection Valve (No.1 M.E.)						1	Y

54	CMS 1.1.2.8	※No.1 Main Bearing and Journal (No.1 M.E.)						1	Y
55	CMS 1.1.2.8	※No.2 Main Bearing and Journal (No.1 M.E.)						1	Y
56	CMS 1.1.2.8	※No.3 Main Bearing and Journal (No.1 M.E.)						1	Y
57	CMS 1.1.2.8	※No.4 Main Bearing and Journal (No.1 M.E.)						1	Y
58	CMS 1.1.2.8	※No.5 Main Bearing and Journal (No.1 M.E.)						1	Y
59	CMS 1.1.2.8	※No.6 Main Bearing and Journal (No.1 M.E.)						1	Y
60	CMS 1.1.2.8	※No.7 Main Bearing and Journal (No.1 M.E.)						1	Y
61	CMS 1.1.2.8	※No.8 Main Bearing and Journal (No.1 M.E.)						1	Y
62	CMS 1.1.2.9	Camshaft(S) and Drive(S) (No.1 M.E.)						1	Y
63	CMS 1.1.2.10	Crankshaft Deflections (No.1 M.E.)						3	Y
64	CMS 1.1.2.11	M.E. Exhaust Manifold (No.1 M.E.)						1	Y
65	CMS 1.1.2.12	Engine Frame and Bedplate (No.1 M.E.)						1	Y
66	CMS 1.1.2.13	Holding Down Bolts and Chocks (No.1 M.E.)						1	Y
67	CMS 1.1.2.14	Stay Bolts (No.1 M.E.)						1	Y
68	CMS 1.1.2.15	Tie Bolts (No.1 M.E.)						1	Y
69	CMS 1.1.2.16	Crankcase Doors and Safety Devices (No.1 M.E.)						1, 3	Y
70	CMS 1.1.2.17	Scavenge case and Safety Devices (No.1 M.E.)						1, 3	Y
71	<b>CMS 3</b>	<b>Shafting</b>							
72	CMS 3.1	Thrust Bearing (Center)						1	Y
73	CMS 3.2	No.1 Intermediate Shaft and Bearing(Center)						1	Y
74	CMS 3.3	No. 1 Foundation, Bolt and Chocks(Center)						1	Y
75	<b>CMS 5</b>	<b>Steam System</b>							
76	CMS 5.3	No.1 Boiler Feed Water Pump and Motor						1	Y
77	CMS 5.3	No.2 Boiler Feed Water Pump and Motor						1	Y
78	CMS 5.3	No.3 Boiler Feed Water Pump and Motor						1	Y
79	CMS 5.3	NO.1 Economizer Feed Water Pump and Motor						1	Y
80	CMS 5.3	NO.2 Economizer Feed Water Pump and Motor						1	Y
81	CMS 5.3	No.1 Boiler Water Circ. Pump and Motor						1	Y
82	CMS 5.3	No.2 Boiler Water Circ. Pump and Motor						1	Y
83	CMS 5.3	No.1 Boiler F.O. Pump and Motor						1	Y
84	CMS 5.3	No.2 Boiler F.O. Pump and Motor						1	Y

85	CMS 5.4	Feed Water Pipes/Valves/Filters						2	Y
86	CMS 5.5	Steam/hot water Pipes, Valves and Fittings						2	Y
87	CMS 5.6	Boiler Oil Pipes, Valves and Fittings						2	Y
88	CMS 5.7	Atmospheric Condenser						1	Y
89	CMS 5.7	Copt Vacuum Condenser						1	Y
90	<b>CMS 6</b>	<b>Compressed Air</b>							
91	CMS 6.1	No.1 Main Air Compressor and Safety Devices						1	Y
92	CMS 6.1	No.2 Main Air Compressor and Safety Devices						1	Y
93	CMS 6.1	Topping Up Compressor and Safety Devices						1	Y
94	CMS 6.1	Service Air Compressor and Safety Devices						1	Y
95	CMS 6.1	Control Air Compressor and Safety Devices						1	Y
96	CMS 6.1	Aux. Air Compressor and Safety Devices						1	Y
97	CMS 6.2	No.1 Main Air Receiver and Safety Devices						1	S
98	CMS 6.2	No.2 Main Air Receiver and Safety Devices						1	S
99	CMS 6.2	General Air Receiver and Safety Devices						1	S
100	CMS 6.2	Control Air Receiver and Safety Devices						1	S
101	CMS 6.2	Aux. Air Receiver and Safety Devices						1	S
102	CMS 6.3	Compressed Air Piping and Fittings						2	Y
103	<b>CMS 7</b>	<b>Fuel Oil System</b>							
104	CMS 7.1	No.1 H.F.O. Purifier Supply Pump and Motor						1	Y
105	CMS 7.1	No.2 H.F.O. Purifier Supply Pump and Motor						1	Y
106	CMS 7.1	No.3.H.F.O. Purifier Supply Pump and Motor						1	Y
107	CMS 7.1	No.1 M/E F.O. Circ. Pump and Motor						1	Y
108	CMS 7.1	No.2 M/E F.O. Circ. Pump and Motor						1	Y
109	CMS 7.1	No.1 M/E F.O. Supply Pump and Motor						1	Y
110	CMS 7.1	No.2 M/E F.O. Supply Pump and Motor						1	Y
111	CMS 7.1	No.1 G/E F.O. Booster Pump and Motor						1	Y
112	CMS 7.1	No.2 G/E F.O. Booster Pump and Motor						1	Y
113	CMS 7.1	No.1 G/E F.O. Supply Pump and Motor						1	Y
114	CMS 7.1	No.2 G/E F.O. Supply Pump and Motor						1	Y
115	CMS 7.1	No.1 H.F.O. Transfer Pump and Motor						1	Y

116	CMS 7.1	No.2 H.F.O. Transfer Pump and Motor						1	Y
117	CMS 7.2	No.1 H.F.O. Purifier						1	Y
118	CMS 7.2	No.2 H.F.O. Purifier						1	Y
119	CMS 7.2	No.3 H.F.O. Purifier						1	Y
120	CMS 7.3	No.1 M/E F.O. Heater						1	Y
121	CMS 7.3	No.2 M/E F.O. Heater						1	Y
122	CMS 7.3	No.1 G/E F.O. Heater						1	Y
123	CMS 7.3	No.2 G/E F.O. Heater						1	Y
124	CMS 7.3	No.1 H.F.O Purifier Heater						1	Y
125	CMS 7.3	No.2 H.F.O Purifier Heater						1	Y
126	CMS 7.3	No.3 H.F.O Purifier Heater						1	Y
127	CMS 7.4	F.O. Pipes/Valves/Filters						2	Y
128	<b>CMS 8</b>	<b>Independent F.O. Oil Tanks</b>							
129	CMS 8.1	M.D.O. STOR.TK(Port)						1	Y
130	CMS 8.1	Emerg.Generator D.O. Tank						1	Y
131	CMS 8.1	Incinerator D.O.Tank						1	Y
132	<b>CMS 9</b>	<b>Lub. Oil System</b>							
133	CMS 9.1	No.1 Main L.O. Pump and Motor						1	Y
134	CMS 9.1	No.2 Main L.O. Pump and Motor						1	Y
135	CMS 9.1	L.O. Transfer Pump and Motor						1	Y
136	CMS 9.1	No.1 L.O. Purifier Supply Pump and Motor						1	Y
137	CMS 9.1	No.2 L.O. Purifier Supply Pump and Motor						1	Y
138	CMS 9.1	No.1 .S/T L.O. Pump and Motor						1	Y
139	CMS 9.1	No.2 .S/T L.O. Pump and Motor						1	Y
140	CMS 9.2	No.1 M/E L.O. Purifier						1	Y
141	CMS 9.2	No.2 M/E L.O. Purifier						1	Y
142	CMS 9.2	G/E L.O. Purifier						1	Y
143	CMS 9.3	No.1 L.O Purifier Heater						1	Y
144	CMS 9.3	No.2 L.O Purifier Heater						1	Y
145	CMS 9.3	Main L.O. Cooler						1	Y
146	CMS 9.3	S/T L.O. Cooler						1	Y

147	CMS 9.4	L.O. Pipes/Valves/Filters						2	Y
148	<b>CMS 10</b>	<b>S.W. Cooling System</b>							
149	CMS 10.1	No.1 Main Cooling S.W. Pump and Motor						1	Y
150	CMS 10.1	No.2 Main Cooling S.W. Pump and Motor						1	Y
151	CMS 10.1	No.3 Main Cooling S.W. Pump and Motor						1	Y
152	CMS 10.1	No.1 C.O.P.T. Condenser Cooling S.W. Pump and Motor						1	Y
153	CMS 10.1	No.2 C.O.P.T. Condenser Cooling S.W. Pump and Motor						1	Y
154	CMS 10.1	No.1 F.W. Generator Ejector Pump and Motor						1	Y
155	CMS 10.1	No.2 F.W. Generator Ejector Pump and Motor						1	Y
156	CMS 10.2	No.1 Central F.W. Cooler						1	Y
157	CMS 10.2	No.2 Central F.W. Cooler						1	Y
158	CMS 10.2	M.E. Jacket F.W. Cooler						1	Y
159	CMS 10.3	S.W. Pipes/Valves and Fittings						2	Y
160	<b>CMS 11</b>	<b>F.W. Cooling System</b>							
161	CMS 11.1	No.1 M/E Jacket Cooler F.W. Pump and Motor						1	Y
162	CMS 11.1	No.2 M/E Jacket Cooler F.W. Pump and Motor						1	Y
163	CMS 11.1	No.1 CENT. C.F.W. Pump and Motor						1	Y
164	CMS 11.1	No.2 CENT. C.F.W. Pump and Motor						1	Y
165	CMS 11.1	F.W. GEN. DIST. Pump and Motor						1	Y
166	CMS 11.1	No.3 CENT. C.F.W. Pump and Motor						1	Y
167	CMS 11.2	No.1 F.W. Cooler						1	Y
168	CMS 11.2	No.2 F.W. Cooler						1	Y
169	CMS 11.2	No.1 F.W. Heater						1	Y
170	CMS 11.2	No.2 F.W. Heater						1	Y
171	CMS 11.3	F.W. Pipes/Valves and Fittings						2	Y
172	<b>CMS 12</b>	<b>Ballast and Fire Fighting System</b>							
173	CMS 12.1	No.1 Water Ballast Pump and Motor						1	Y
174	CMS 12.1	No.2 Water Ballast Pump and Motor						1	Y
175	CMS 12.2	Ballast Pipes/Valves/Filters						2	Y
176	CMS 12.3	Fire Pipes/Valves/Filters						2	Y
177	<b>CMS 13</b>	<b>Bilge System</b>							

178	CMS 13.1	No.1 Bilge, Fire & G/S Pump and Motor						1	Y
179	CMS 13.1	No.2 Bilge, Fire & G/S Pump and Motor						1	Y
180	CMS 13.1	Oily Bilge Pump and Motor						1	Y
181	CMS 13.1	Sludge Pump and Motor						1	Y
182	CMS 13.3	Bilge Pipes/Valves/Filters						2	Y
183	<b>CMS 14</b>	<b>Deck Machine and Hyd. System</b>							
184	<b>CMS 14.1</b>	<b>Steering Gear</b>							
185	CMS 14.1.1	No.1 Steering Gear(AFT)						1	Y
186	CMS 14.1.2	No.1 Control , Alarm and Safety Devices of Steering Gear (AFT)						2	Y
187	CMS 14.2	No.1 Windlass						1	Y
188	CMS 14.2	No.2 Windlass						1	Y
189	CMS 14.3	No.1 Steering gear hydraulic pump and Motor						1	Y
190	CMS 14.3	No.2 Steering gear hydraulic pump and Motor						1	Y
191	CMS 14.3	No.1 Windlasses hydraulic pump and Motor						1	Y
192	CMS 14.3	No.2 Windlasses hydraulic pump and Motor						1	Y
193	CMS 14.3	No.1 winch hydraulic pump and Motor						1	Y
194	CMS 14.3	No.2 winch hydraulic pump and Motor						1	Y
195	CMS 14.3	No.3 winch hydraulic pump and Motor						1	Y
196	CMS 14.3	No.4 winch hydraulic pump and Motor						1	Y
197	CMS 14.4	Hyd. Oil Power Station						2	Y
198	<b>CMS 15</b>	<b>Electrical installation and Aux.Eng.</b>							
199	<b>CMS 15.1</b>	<b>Prime Mover</b>							
200	CMS 15.1.1	No.1 Prime Mover (Aux. Diesel Engine)						1	Y
201	CMS 15.1.1	No.2 Prime Mover (Aux. Diesel Engine)						1	Y
202	CMS 15.1.1	No.3 Prime Mover (Aux. Diesel Engine)						1	Y
203	CMS 15.1.3	Foundation, Bolt and Chocks for auxiliary engines						1	Y
204	CMS 15.2	No.1 Generator						1	Y
205	CMS 15.2	No.2 Generator						1	Y
206	CMS 15.2	No.3 Generator						1	Y
207	<b>CMS 15.3</b>	<b>Tests of generator set</b>							

208	CMS 15.3.1	No.1 Generator Control , Alarm and Safety Devices						2	Y
209	CMS 15.3.1	No.2 Generator Control , Alarm and Safety Devices						2	Y
210	CMS 15.3.1	No.3 Generator Control , Alarm and Safety Devices						2	Y
211	CMS 15.3.2	Generator parallel operation, load distribution and shutoff						2	S
212	CMS 15.3.3	Loading tests and governor tests of generator set (No.1 )						2	S
213	CMS 15.3.3	Loading tests and governor tests of generator set (No.2 )						2	S
214	CMS 15.3.3	Loading tests and governor tests of generator set (No.3 )						2	S
215	CMS 15.4	Main Switchboard and Fittings						2, 3	Y
216	CMS 15.5	Section Switchboard and Fittings						2, 3	Y
217	CMS 15.6	No.1 Circuit Breakers						2, 3	S
218	CMS 15.6	No.2 Circuit Breakers						2, 3	S
219	CMS 15.6	No.3 Circuit Breakers						2, 3	S
220	CMS 15.7	Emerg. Generator Set						1	Y
221	CMS 15.8	Emergency Switchboard and Fittings						2, 3	Y
222	CMS 15.9	Emerg. Battery Source and Switchboard						2, 3	Y
223	CMS 15.10	Cables						2	Y
224	CMS 15.11	Lighting						2	Y
225	CMS 15.12	Navigation Lighting, indicators						2	Y
226	CMS 15.13	Insulation Resistance						3	Y
227	CMS 15.14	Telephone						2	Y
228	CMS 15.15	Engine telegraph						2	Y
229	CMS 15.16	The second means of communication						2	Y
230	CMS 15.17	Transformer						2, 3	Y
231	CMS 15.18	Public address system						2	Y
232	CMS 15.19	General emergency alarms						2	Y
233	<b>CMS 16</b>	<b>Ventilation System</b>							
234	CMS 16.2	No.1 E/R VENT. Fan						1	Y
235	CMS 16.2	No.2 E/R VENT. Fan						1	Y
236	CMS 16.2	No.3 E/R VENT. Fan						1	Y
237	CMS 16.2	No.4 E/R VENT. Fan						1	Y
238	CMS 16.2	Cargo Pump Room Fan						1	Y

239	<b>CMS 17</b>	<b>Automation of Machinery</b>							
240	CMS 17.1	Alarm indicators						2	Y
241	CMS 17.2	Automated system of main propulsion machinery							
242	CMS 17.3	Bridge control station						2	Y
243	CMS 17.4	Centralized control station						2	Y
244	CMS 17.5	Local control station						2	Y
245	CMS 17.6	M/E oil mist detectors							
246	CMS 17.7	Test of Manual Control						2	Y
247	CMS 17.8	Test of system power failure and recovery						2	Y
248	CMS 17.9	Boiler automatic system						2	Y
249	CMS 17.10	Auxiliary engine automatic system						2	S
250	CMS 17.11	Power plant automatic system						2	S
251	CMS 17.12	Automatic starting and control system of emergency generator						2	Y
252	CMS 17.13	Change-over of standby equipment						2	Y
253	CMS 17.14	Automatic control system of other essential machineries						2	Y
254	CMS 17.15	Detecting and automatic control of bilge system in engine room						2	Y
255	CMS 17.16	Fire alarm system						2	Y
256	CMS 17.17	Alarm record device						2	Y
257	CMS 17.18	Remote control of sea valves						2	Y
258	CMS 17.19	Engineer's alarm						2	Y
259	CMS 17.20	Extended alarm						2	Y
260	CMS 17.21	Maneuvering tests of suction valves and discharge valves below waterline						2	Y
261	<b>CMS 19</b>	<b>Additions To Tanker Having Class Notation IGS</b>							
262	<b>CMS 19.1</b>	<b>Inert Gas Generator</b>							
263	CMS 19.1.1	Flue gas Generator						1	Y
264	CMS 19.1.2	Inert gas generator						1	Y
265	CMS 19.2	No.1 Inert Gas Blower						1	Y
266	CMS 19.2	No.2 Inert Gas Blower						1	Y
267	CMS 19.3	Inert gas distribution pipes and check valves, including soot blower interlock devices						1	Y
268	<b>CMS 19.4</b>	<b>Deck Seal Device</b>							

269	CMS 19.4.1	No.1 Deck Water Seal Pump and Motor						1	Y
270	CMS 19.4.1	No.2 Deck Water Seal Pump and Motor						1	Y
271	CMS 19.4.2	Deck water seal water pipe, valves and fittings						1	Y
272	CMS 19.6	Deck mechanical non-return devices						1	Y
273	<b>CMS 19.7</b>	<b>Scrubber</b>							
274	CMS 19.7.1	No.1 Scrubber Cooling Water Pump and Motor						1	Y
275	CMS 19.7.1	No.2 Scrubber Cooling Water Pump and Motor						1	Y
276	CMS 19.7.2	Scrubber cooling water pipe, valves and fittings						1	Y
277	CMS 19.12	Inert gas Piping, Valves and Vent System						2	Y
278	CMS 19.13	Control and Safety Device						2	Y
279	CMS 19.14	Pressure-vacuum breakers						1, 3	Y
280	CMS 19.15	Pressure Vacuum Devices						1, 3	Y

Place TEST

(TEST)

Date TEST

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