GUIDANCE NOTES
GD11-2020

GUIDELINES FOR CONDITION ASSESSMENT PROGRAMME

(CAP) FOR EXISTING SHIPS

2020

Effective from 1 July 2020

CONTENTS

1 General

1.1 Scope

1.1.1 Condition Assessment Programme (CAP) is a technical service to provide for applicants with no relation to the class of ship. It is an independent and thorough verification to rate the actual condition of the ship, based upon detailed inspection and function testing, thickness measurements and strength calculation and performance testing.

1.1.2 The CAP is applicable to oil tankers, bulk carriers, LPG carriers and chemical tankers of 15 years of age and above, and may well be used for ships at other ages and for other types of ships.

1.1.3 CAP requested by RIGHTSHIP and BP is to meet their special requirements. Reference is given in Appendix 4 and Appendix 8 of the Guidelines.

1.2 Purpose

1.2.1 The purpose of CAP is to provide applicants with a document and statement of ship's actual condition such as structural strength, machinery and maintenance of ship's life, etc., which could be used towards cargo owners and/or authorities in connection with entry into new charters or renewal of existing ones beyond expire dates.

1.2.2 The CAP established a sound technical basis for:

(1) decisions on repair or investments in order to extend the lifetime of the ship; and

(2) buying and selling of the ship.

1.3 Application

1.3.1 A written application is to be sent to the Headquarters of IS Class (hereinafter referred to as ISC) by the applicant (e.g. ship owner, ship operator or bareboat charterer) for CAP service by ISC. A notification of CAP service may be downloaded from ISC website: http://www.ISC.org.cn.

1.3.2 The applicant is to apply to ISC at least 2 months before the requested commencement of the CAP-inspection.

1.3.3 The applicant is to arrange for thickness measurements to be carried out according to the requirements of the Guidelines, and the report is to be in the format of ultrasonic thickness measurements (UTM) developed by ISC.

1.3.4 The applicant is to prepare for the inspection by providing necessary working conditions and adequate means. The applicant is also to make sure that the master is properly informed about the forthcoming inspection. At least one of the officers onboard must escort the CAP team full-time during the inspection.

1.3.5 The applicant is to pay the fees as required in the contract.

1.4 Composition of CAP

1.4.1 In general, the CAP consists of two modules, one is CAP for hull structures (HCAP) and the other is CAP for machinery (MCAP). The applicant may select the whole or one module or parts of it only, if applicable. However, illustration is to be given on the notification.

1.4.2 In general, HCAP is to include check of documents and records, overall, internal and close-up surveys, thickness measurements and analysis, as well as strength assessment including longitudinal strength calculations, re-assessment of scantlings and fatigue strength assessment. Re-assessment of scantlings and fatigue strength assessment are optional.

1.4.3 In general, MCAP includes check of documents and records, overall survey of machinery, function test, oil sample analysis and vibration measurement.

1.5 Condition assessment and scale of rating

1.5.1 The condition assessment is to be carried out by the CAP team organized by ISC. Based on the results of CAP inspection, measurement, testing and strength calculation, it is to be rated in accordance with the requirements of 1.5.2.

1.5.2 A rating system ranging from 1 (best) to 4 (lowest) has been established as follows:

Rating **Table 1.5.2**

Rating	Hull	Machinery
Rating 1 - in very good condition	Items examined and measured found with only superficial reductions from as new or current rule scantling. No maintenance or repair required.	Items and systems examined and function tested, found with no deficiencies affecting safe operation and/or performance. Documentation and maintenance practices considered good. No maintenance or repair required.
Rating 2 - in good condition	Items examined and measured found to have deficiencies of a minor nature not requiring repair, or found to have thicknesses substantially above class renewal levels.	Items and systems examined and function tested, found with some minor deficiencies which do not affect safe operation and/or normal performance. Documentation and maintenance practices considered adequate. No immediate maintenance or repair considered necessary.
Rating 3 – in acceptable condition	Items examined and measured either found to have deficiencies which do not require immediate corrective action, or found to have thicknesses above class renewal levels, indicating existence of sustainable corrosion.	Items and systems examined and function tested, found with deficiencies not affecting safe operation and/or performance. Documentation and maintenance practices considered to be of a minimum standard. Some maintenance and repair may be considered necessary.
Rating 4 – in unacceptable condition	Items examined and measured either found to have a deficiency or deficiencies which may affect the ship's potential to remain in class, or found to have, in some areas, thicknesses which are at or below class renewal levels.	Items and systems examined and function tested, found with deficiencies significantly affecting operation and/or performance. Documentation and maintenance practices considered inadequate. Maintenance and repair required to reinstate serviceability.

1.6 Procedure for Condition Assessment Programme

Procedure for Condition Assessment Program is given in Figure 1.6.

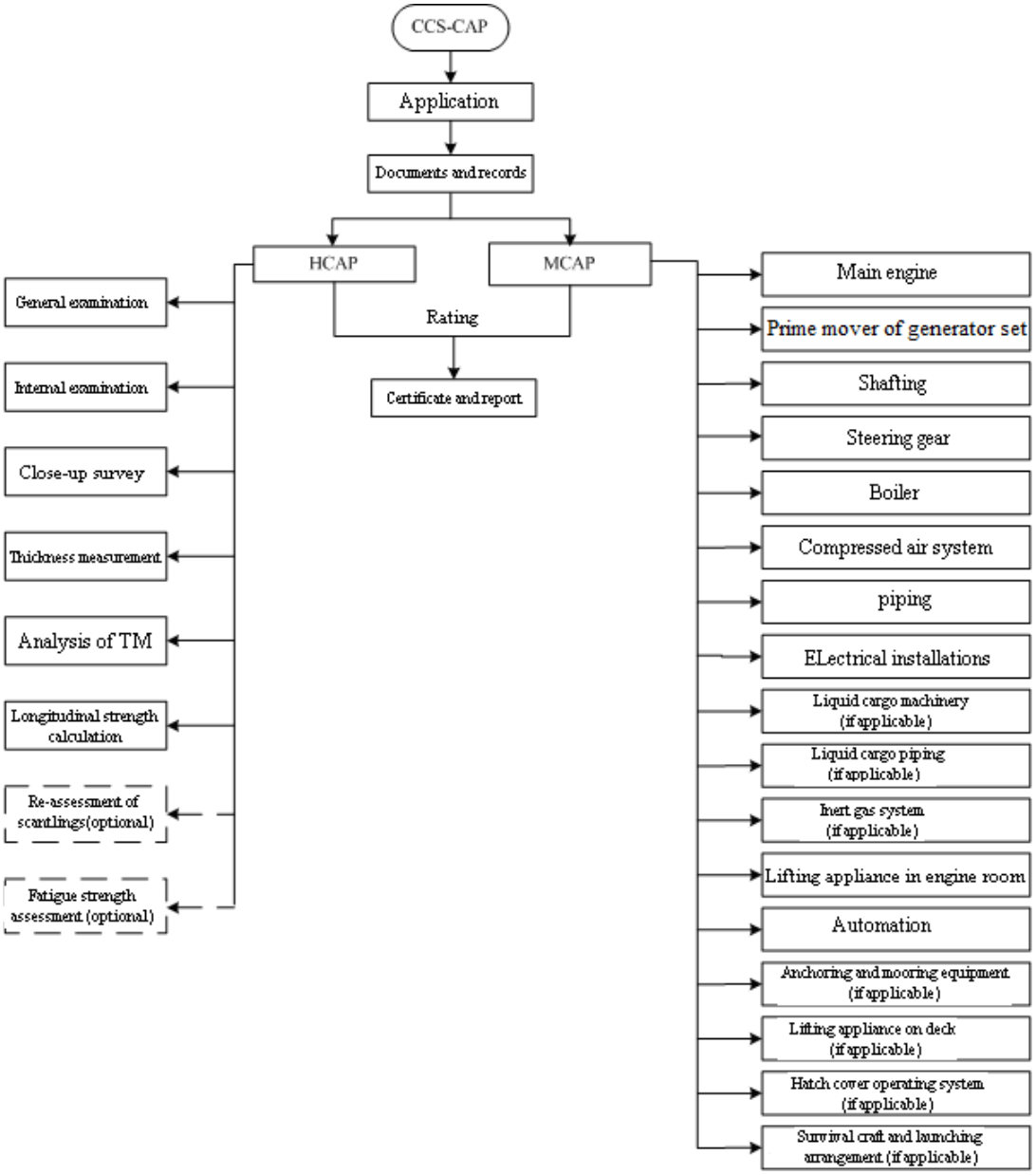
CCS-CAP
Application
Documents and records
HCAP
MCAP
Rating
Certificate and report
General examination
Internal examination
Close-up survey
Thickness measurement
Analysis of TM
Longitudinal strength calculation
Re-assessment of scantlings(optional)
Fatigue strength assessment (optional)
Main engine
Prime mover of generator set
Shafting
Steering gear
Boiler
Compressed air system
piping
ELectrical installations
Liquid cargo machinery (if applicable)
Liquid cargo piping (if applicable)
Inert gas system (if applicable)
Lifting appliance in engine room
Automation
Anchoring and mooring equipment (if applicable)
Lifting appliance on deck (if applicable)
Hatch cover operating system (if applicable)
Survival craft and launching arrangement (if applicable)

Figure 1.6

2 Condition Assessment Programme for Hull Structures (HCAP)

2.1 General requirements

2.1.1 Condition Assessment Programme for Hull Structures (HCAP) is to have a ship judged based on the actual condition of the hull structure. In general, HCAP is to include check of documents and records onboard the ship, inspection of hull structural members and their fittings (including visual inspection, thickness measurement and analysis of TM), strength assessment of hull structures and scale of rating.

2.1.2 Hull inspection is normally to be carried out in dry dock.

2.2 Check of documents and records onboard

2.2.1 The following documents and records are to be checked prior to the commencement of CAP survey in order to clearly indicate defects found during the past surveys, especially recurring defects, such as fractures, cracking, excessive wastage, fatigue damage etc. so that they can be clearly identified and paid particular attention by the attending CAP inspector:

(1) the Inspection Plan;

(2) valid certificates of the ship (statutory certificate and class certificate);

(3) repair history of the ship (including alterations or modifications, properties of deficiencies and repair methods);

(4) survey records of the ship (special survey, annual survey, intermediate survey and docking survey);

(5) the latest report of thickness measurement;

(6) previous CAP reports, if any.

2.2.2 Plans and documents required for strength assessment of hull structures:

(1) general arrangement;

(2) transverse mid-section plan;

(3) construction profile, including bulkhead;

(4) shell expansion;

(5) loading manual;

(6) records of thickness measurement at the time of assessment;

(7) other necessary plans.

2.3 Inspection for hull structures and their fittings

2.3.1 General examination

(1) weather deck;

(2) shell plating (including sea chests);

(3) rudder structures;

(4) anchors and chain cables.

2.3.2 Internal examination

(1) all cargo holds*;

(2) all ballast tanks*;

(3) One fuel tank in the engine room area, half of the cargo length area but not less than 2 fuel tanks; if there is no fuel tank in the cargo length area, two fuel tanks (if fitted) outside the engine room; one lubricating oil tank; all the fresh water tanks;

(4) engine room;

(5) fore peak and aft peak tanks;

(6) all other compartments (pump room, cofferdams and pipe tunnels).

Note: *Where applicable, the corrosion protection system is to be carefully examined.

2.3.3 Close-up survey

2.3.3.1 The scope and requirements for close-up survey are given in Appendix 2.

2.3.4 Thickness measurement

2.3.4.1 Thickness measurement is to be carried out by a recognized thickness measurement company under the direction of CAP inspector. The results of thickness measurement carried out by the recognized company within 12 months prior to the commencement of CAP survey may be acceptable after the assessment of the CAP inspector. The requirements for thickness measurement are given in Appendix 3.

2.3.5 Analysis of thickness measurement

2.3.5.1 The main purpose of the analysis of thickness measurements is to establish the extent of general corrosion for each structural element to be rated. A statistical analysis of thickness diminutions will be carried out against original "as-built" scantlings. Where the applicant selects the re-assessment of scantlings (see 2.4.3 of the Guidelines), analysis may be based on the current rules scantlings.

2.3.5.2 The analysis of thickness measurement carried out by using a statistical method with 90% reliability (S-curve method) applies to the TM data of each structural element in a certain tank or space. The structural elements include deck, side shell, bottom, inner bottom, transverse bulkheads, longitudinal bulkheads and internal structure and hatches and coamings (only for bulk carrier). The rating of analysis of TM is given in Appendix 1.

2.4 Strength assessment of hull structures

2.4.1 General requirements

2.4.1.1 The structural strength assessment consists of three parts, i.e. longitudinal strength calculation, re-assessment of scantlings and fatigue strength assessment. As the two options, re-assessment of scantlings and fatigue strength assessment may be carried out according to the applicants' request.

2.4.2 Longitudinal strength calculations

2.4.2.1 At least 3 representative cross sections[*1] are to be selected in the cargo hold area for longitudinal strength calculations so as to carry out bending strength and buckling strength calculations, the ship’s approved allowable still water bending moments used in the calculations are to be obtained from loading manual. The following items are to be calculated:

(1) Hull girder section modulus, W, required by the current ISC rules.

(2) The actual section modulus, W_{act}, in deck and bottom of the representative as-measured cross sections by using the thickness measurement data.

(3) The buckling utilization factor, η^{*2}, in deck and bottom of the representative as-measured cross sections by using the thickness measurement data.

Notes:
*1: The representative cross sections used in this Section are in accordance with those for thickness measurement.

*2: Buckling utilization factor, $\eta=\sigma/\sigma_c$,
σ: hull girder compressive stress in deck or bottom, in N/mm^2;
σ_c: critical compressive buckling stress in deck or bottom, in N/mm^2.

2.4.3 Re-assessment of scantlings (optional)

2.4.3.1 In general, the following scantlings of structure are to be re-assessed unless the applicant has special request:

(1) scantlings of ship's hull plating and main deck and stiffeners in the cargo hold area;

(2) scantlings of ship's transverse and longitudinal bulkhead plating and stiffeners in the cargo hold area.

2.4.4 Fatigue strength assessment (optional)

2.4.4.1 A simplified fatigue analysis is to be carried out for all the end connections of longitudinal stiffeners to transverse bulkheads and web frames within the cargo area, located on the strength deck, side shell, bottom shell, inner bottom and longitudinal bulkheads using a "nominal stress approach".

2.4.4.2 All areas with longitudinal stiffener end connections estimated to have fatigue life less than the current age of the ship + 3 years have been identified as "hot spots" where fatigue problems may occur and close-up surveyed as part of the CAP survey. Fatigue strength assessment is to be carried out and completed prior to the CAP site survey to enable the "hot spots" to be subject to close-up inspection during CAP survey.

2.4.4.3 There might be a possibility of requiring reinforcement for "hotspots" after having reviewed the results of fatigue strength assessment together with actual condition by site survey and history (damage reports etc.).

2.5 Rating

2.5.1 Details for the rating methodology are given in Appendix 1.

3 Condition Assessment Programme for Machinery (MCAP)

3.1 General requirements

3.1.1 In general, MCAP is to include check of documents and records, visual inspection, function test, collection and measurement of machinery parameters, vibration measurement, oil sample analysis and rating.

3.1.2 The items of inspection for MCAP include main engine/generating set prime mover, propulsion system, boiler and pressure vessel, piping system and machinery piping system, electric/automatic system, deck machinery and liquid cargo machinery and piping, etc., for details, refer to Appendix 6 and Appendix 7.

3.1.3 MCAP is to include an inspection under voyage condition.

3.1.4 Perform an inspection for the liquid cargo machinery and piping during unloading operations.

3.1.5 Rating methodology of MCAP is given in Appendix 5.

3.2 Check of documents and records

3.2.1 Perform check of validity of class certificates (including statutory certificates and class certificates).

3.2.2 Perform check of ship's survey records.

3.2.3 Perform check of validity of planned maintenance scheme (PMS) for machinery (including the repair/change item in the PMS report made by the chief engineer), if the PMS is applied.

3.2.4 Perform check of report of lubricating oil analysis record and result and verify the qualification of lubricating oil analysis unit and analysts if the lubricating oil condition monitoring system for diesel engines and/or the condition monitoring system for screwshaft is applied. Where necessary, a new analysis may be required.

3.2.5 The documents required for check are also to include an order list or a list of machinery and electrical equipment, specifications of main engine/generating set prime mover, a sea trial report after delivery, records of repair and maintenance, reports of oil sample analysis, a report of boiler water analysis and a list of spares/tools, etc.

3.3 Condition inspection for machinery

3.3.1 Main engine/generating set prime mover

3.3.1.1 Perform pressure indication of all cylinders of main engines and generating set prime movers (if applicable) at minimum two running conditions: normal voyage condition and minimum but preferably not less than 80% rated power. Compare and analyse the performance data with the maker's recommendations (or history data) in order to evaluate the dynamic property and efficiency of the diesel engine.

3.3.1.2 Compare distributed instrumentation (pressure/temperature/etc.) in control room with local instrumentation on Engine. Compare data with maker's recommendations (or history data).

3.3.1.3 Perform visual inspection for main engine/generating set prime mover with respect to leakages.

3.3.1.4 Perform visual inspection of all sub-systems for main engine/generating set prime mover. Check the relevant plans, information and records. Collect the working parameters (temperature, pressure, etc.) for heaters, coolers, pumps, pipes and valves, etc. and relevant information (types, materials, manufacturing dates, etc.).

3.3.1.5 Inspect fuel system (including heating, viscosity control, temperature, alarm and regulator

of heater, pump, valve, filter, etc.). Check fuel oil type.

3.3.1.6 Perform vibration measurements of both fuel oil and lub. oil purifier. Analyse the current condition of purifier by checking of maintenance record or function test. Note down type of s purifiers. Check separation lay-out, temperatures, alarm and regulator of heaters, etc.

3.3.1.7 Perform check of maintenance record of all rotating equipment for main engine/ generating set prime mover and its supercharger and sub-system (such as pumps in seawater cooling system, fresh water cooling system and fuel oil pressurizing system, etc.) and perform vibration measurements of them.

3.3.1.8 Perform oil sample analysis of main engine/generating set prime mover lub. oil system and turbocharger lub. oil system.

3.3.1.9 Perform function test of starting air system for main engine/generating set prime mover. All compressors should be started. Check automatic starting system and pressure rising time, and time between compressor start.

3.3.1.10 Perform check of maintenance record of compressors and electric motors and perform vibration measurement of them.

3.3.1.11 Provoke the load of generating set prime mover to a set value (overload), check the automatic discharging of secondary load and automatic starting of standby generating set.

3.3.2 Propulsion system

3.3.2.1 Perform general examination of propulsion shafting. Check the lubrication for sealing of bearing before the stern tube, reduction gearbox, thrust bearing and intermediate bearing and measure temperatures. Check vibration condition of shafting (including shock absorber). Where applicable, perform vibration measurement for shafting, measurement of bearing clearance and oil sample analysis of Lub. oil, etc.

3.3.2.2 Perform visual inspection of oil pressure system and control system of the controllable pitch propeller, verification test for the propeller from ahead full pitch to astern full pitch. Note down temperature of oil pressure system, where necessary, perform oil sample analysis for hydraulic oil.

3.3.2.3 Perform visual inspection and vibration measurement of steering gear/side thrusters under normal voyage condition, check electrical system. Witness the operation test from full port to full starboard. Witness the take-over test from automatic to manual on bridge, from automatic to manual locally. Test alarming system (power supply/oil pressure);perform oil sample analysis for hydraulic oil.

3.3.3 Boiler and pressure vessel

3.3.3.1 Perform visual inspection of boiler, note down working temperature, pressure, etc. and check repair and maintenance records.

3.3.3.2 Witness function test of safety alarms and stop functions for boiler, such as flame failure, water level high, water level lower, water level too low and steam pressure too high. Provoke tripping of feed water pumps and witness automatic start of standby pumps. Where necessary, perform verification test for functions of safety valve.

3.3.3.3 Perform visual inspection of steam condensers and hot water tanks, witness function test of soot blowers.

3.3.3.4 Perform visual inspection of main/auxiliary air receivers, check isolating valves, pressure gauges, discharging devices, etc. Where necessary, witness function test of safety valves of air receivers (or fusible plugs), perform thickness measurement for shield of air receivers.

3.3.4 Piping

3.3.4.1 Perform visual inspection of seawater piping, fresh water piping, ballast piping, bilge

piping, fuel oil piping, Lub. oil piping, hydraulic piping, compressed air piping, exhaust piping, steam piping, and feed water piping, etc. Check for leaks, insulation, supporting and perform vibration measurement, witness a function test of pumps, valves, filters, heat-exchangers, instrumentation, etc. Perform vibration measurements for generators and pumps. Where necessary, perform an overhaul inspection or thickness measurement.

3.3.4.2 Perform visual inspection of ventilation, witness function test of fans and perform a vibration measurement.

3.3.5 Electrical/automatic system

3.3.5.1 Perform visual inspection of generators/transformers during normal operation, check cleanliness, cables, cable protection, noise, etc.

3.3.5.2 Witness performance test of each generator from 0 to 100% load. Note down variation in frequency (max. -5%) and voltage (max. 5%).

3.3.5.3 Provoke the load of generators to a set value (overload), check automatic starting of standby generating set and automatic discharging of secondary load. Witness a load sharing and take-over from one to two (or several) generator(s).

3.3.5.4 Perform visual inspection of main switch, check cleanliness, repair works, loose connections, etc. Check the operability of the switchboard and its equipment.

3.3.5.5 Perform check of insulation resistance on each system of main switch board and check latest megger test list for all outgoing circuits.

3.3.5.6 Check protection of output line current carrying parts, such as distribution boards and parts, check size of fuses and circuit breakers related to actual electrical consumer, check settings of over current relays for electrical motors for essential consumers, check cable fixing, cable penetrations through gastight and water tight penetrations, check cable entrances to electrical motors, starters and other enclosures.

3.3.5.7 Perform visual inspection and witness function test of remote control, automatic control, monitoring, and alarming systems of electrical equipment (or installations) according to various degrees of the ship’s automation.

3.3.6 Deck machinery

3.3.6.1 Perform visual inspection of windlasses, winches, lifting appliances, hatch cover operating equipment, survival craft and launching arrangements, and relevant hydraulic system. Check cleanliness, seal, ruptures, oil leakage and rusting. Check rusting and fixing of foundation.

3.3.6.2 Check and verify function tests, including test of safety equipment, e.g. perform verification test of the hydraulic system provided with alarms (for power supply/oil pressure), where necessary, perform oil sample analysis.

3.3.6.3 All windlass and winch brakes are subject to brake test under safe working load. The test is to be witnessed by CAP inspector.

3.3.6.4 Safe Working Load is to be indicated for bollards and guide rollers.

3.3.6.5 Where applicable, all hydraulic pipe work for hatch covers must be well coated with no active corrosion.

3.3.7 Liquid cargo machinery and piping

3.3.7.1 Perform visual inspection of main machinery and piping for cargo handling and storage, and for tank washings and oily water treatment. Check leaks, insulation and supporting. Perform vibration measurement. Where necessary, perform an overhaul inspection or thickness measurement.

3.3.7.2 Check and verify function tests of main liquid cargo piping and equipment, including cargo oil piping, inert gas piping, venting piping for cargo oil tanks, cargo oil heating piping, tank

washing piping and oily water treatment piping, and measure and note down the relevant data.

3.3.7.3 Check and verify function tests of the monitoring and control system of liquid cargo machinery and piping, and its cargo gauging system, cargo oil/ballast valve remote control system, and combustible gas detection system. Check relevant records in the log book.

4 CAP Certificate and Report

4.1 General requirements

4.1.1 A CAP Certificate is to be issued and a report to be completed after the CAP inspection. The report is to include the place and date of inspection and related information, such as whether the CAP inspection is carried out in dock or at sea.

4.2 HCAP report

4.2.1 The HCAP report at least consists of:

(1) statement of facts;

(2) general information and particulars of the ship;

(3) summary of findings from inspection and structural strength calculations;

(4) CAP rating summary;

(5) review of repair history and previous class survey records;

(6) structural strength analysis and rating;

(7) analysis of the findings of site survey and rating;

(8) descriptions and photos of defects before/after repairs;

(9) photographic evidence of the condition in each tank / space;

(10) report for longitudinal strength calculation;

(11) report for re-assessment of scantlings as applicable;

(12) report for fatigue strength assessment as applicable.

4.3 MCAP report

4.3.1 The MCAP report at least consists of:

(1) statement of facts;

(2) general information and particulars of the ship;

(3) summary of assessment of machinery and electrical installations;

(4) record of assessment of machinery and electrical installations;

(5) photographic evidence of the condition of machinery and electrical installations;

(6) list of machinery and electrical installations;

(7) sea trial records for main engine/generating set prime mover;

(8) report for analysis of lubrication oil;

(9) report for vibration test;

(10) report for brake tests for windlass and winch as applicable.

Appendix 1 CAP Hull Rating Methodology

1 General principles of rating

1.1 This appendix describes the aspects and procedures and criteria involved in the process of CAP hull rating.

1.2 CAP hull rating is carried out normally according to the following procedures and applicable criteria. The final CAP Hull rating is decided by ISC CAP rating committee.

1.3 Rating of all tanks/spaces is included in the rating of internal structures. For tanks/spaces with common boundary, the values of thickness measurement of the common boundary are taken into account in the tanks/spaces on both sides.

1.4 In addition to coating condition, HCAP is divided into 4 ratings, namely CAP1, CAP2, CAP3 and CAP 4, which correspond to point 1, 2, 3 and 4. The value is specified with one decimal while the average of the grades is calculated (rounding-off).

2 Classification of items of rating

2.1 CAP hull rating is divided into two parts, i.e. survey rating and structural strength rating.

2.2 The hull is divided into many tanks/spaces/areas which are rated separately during the survey rating, such as ballast tanks, cargo tanks/holds (including cofferdams, pump rooms) and external structure (weather strength deck and hull plating along the full length of the ship). Each tank/space/area is divided into many structural elements corresponding to the boundaries and corresponding associate's structure of the space (including plating and associated stiffener).

(1) deck (or platform);

(2) side shell (port/starboard);

(3) bottom;

(4) inner bottom;

(5) transverse bulkheads (fore/aft);

(6) longitudinal bulkheads(port/center/starboard);

(7) internal structure (stringers, web frames, girders, floor, swash bulkheads and the associated stiffener);

(8) hatches and coamings (only for bulk carrier).

2.3 The rating of each structural element is based on visual inspection, analysis of thickness measurements (UTM), condition of coating (only for ballast tanks).

2.3.1 Visual inspection rating

The visual inspection is divided into items:

(1) cracking;

(2) local corrosion (including pitting corrosion, grooving corrosion and edge corrosion);

(3) deformation;

(4) condition of anodes as applicable;

(5) any other local defect.

The visual inspection rating is carried out based on the result of the above inspection. In general, the lowest of the cracking, local corrosion and deformation rating is decisive towards the final result of visual inspection rating.

2.3.2 Thickness measurement rating

The main purpose of the analysis of thickness measurements is to establish the extent of general corrosion for each structural element to be rated. A statistical analysis of thickness diminutions will be carried out against original "as-built" scantlings. Where the applicant selects the re-assessment of scantlings (see 2.4.3 of the Guidelines), analysis may be based on the current rules scantlings. The analysis of thickness measurement carried out by using a statistical method with 90% reliability (S-curve method) applies to the UTM data of each structural element in a certain tank/space/area. The UTM based rating for the structural element is determined by which sector the element curve crosses the 90% percentile indicated by the horizontal dotted line as shown in Figure 2.3.2 (Figure 2.3.2 shows CAP 2 rating for the deck).

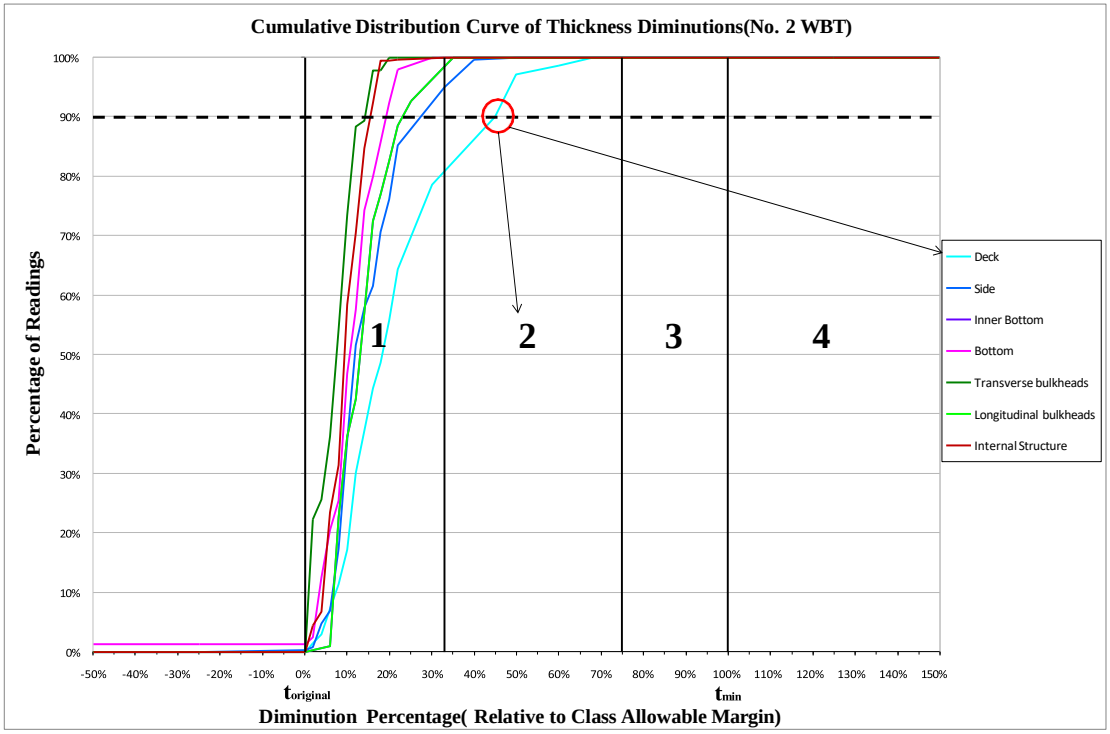

Figure 2.3.2

2.3.3 Coating condition rating

Coating condition forms an integral part of the survey rating of structural elements in ballast tanks. Coating condition of all structural elements in ballast tanks is to be evaluated and rated independently.

2.4 Structural strength rating

The structural strength rating is based on the calculations of longitudinal strength, including bending strength and buckling strength.

2.4.1 Bending strength rating

The actual section modulus, W_{ac}, in deck and bottom is calculated respectively by using the thickness measurement data.

2.4.2 Buckling strength rating

The buckling utilization factor, η, in deck and bottom is calculated respectively by using the thickness measurement data.

3 Rating

3.1 The flow chart of rating is shown as Figure 3.1.

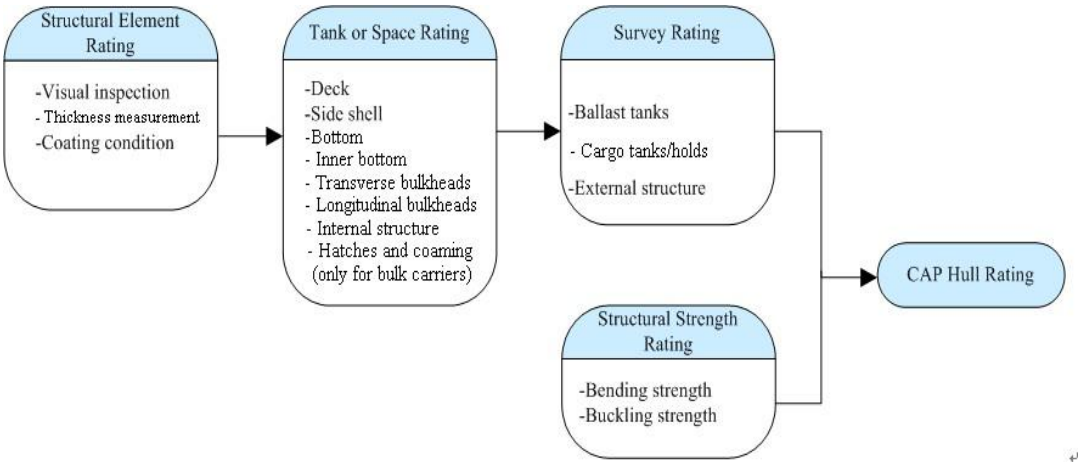

Figure 3.1

4 Rating criteria

4.1 Rating criteria for visual inspection

4.1.1 Cracking

Crack of structural elements found in the survey is to be repaired.

Once the crack is found, the rating of the structural element is normally not higher than CAP 2.

Any recurring critical cracks found in main structural elements due to design defects, which may lead to a CAP 3 rating for that element even after repairs if no design modifications are carried out to avoid new cracks of similar type in the near future.

4.1.2 Local corrosion

Rating criteria for local corrosion is given in Table 4.1.2.

Table 4.1.2

Item	Rating scale			
	CAP 1	CAP 2	CAP 3	CAP 4
Local corrosion margin ,*i*	$i \leq 0.33A$	$0.33A < i \leq 0.75A$	$0.75A < i \leq A$	$i > A$

Note: A= allowable local corrosion margin.

4.1.3 Deformation

Rating criteria for deformation is given in Table 4.1.3.

Table 4.1.3

Item	Rating scale			
	CAP 1	CAP 2	CAP 3	CAP 4
Deformation margin , *f*	$f \leq 0.33D$	$0.33D < f \leq 0.67D$	$0.67D < f \leq D$	$f > D$

Note: D= allowable deformation limit.

4.2 Rating criteria for thickness measurement

Rating criteria for thickness measurement is given in Table 4.2.

Table 4.2

Item	Rating scale			
	CAP 1	CAP 2	CAP 3	CAP 4
Diminution ratio, *r*	*r≤33%*	*33%<r≤75%*	*75%<r≤100%*	*r>100%*

Note: *r*=the ratio of actual thickness diminution to allowable margin.

4.3 Rating criteria for coating condition

Rating of coating conditions are divided into “GOOD”, “FAIR” and “POOR”, here corresponding to "CAP1","CAP2" and "CAP3". They correspond to points 1, 2 and 3 when the grades are calculated. The value is specified with one decimal while the average of the grades is calculated (rounding-off). The rating criteria for coating conditions are shown in Table 4.3.

Table 4.3

Item	Rating Scale		
	GOOD (CAP 1)	FAIR (CAP 2)	POOR (CAP 3)
Coating condition	condition with only minor spot rusting	condition with local breakdown of coating at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition	condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration

4.4 Structural element rating

The rating of each structural element is based on the rating of visual inspection, analysis of thickness measurement and coating condition. The points of the grades of each item are given to calculate the average of the rating of the structural element.

4.5 Tank/space/area rating

The overall rating for each tank/space/area is based on the overall structural average rating of each structural element. The tank average rating is calculated as the average of the overall structural average ratings for each structural element. The tank average rating is rounded as an integer governed by the following rules, namely, the tank/space/area overall rating.

(1) The rating of tank/space/area is not to be better than one higher of the lowest rating of visual inspection, UTM or coating condition for the structural element.

(2) Where substantial corrosion is found in tank/space/area, the rating of the tank/space/area is not to be higher than CAP 3.

(3) Where the rating of visual inspection or thickness measurement of the structural element in the tank/space/area is CAP 4, the tank/space/area is only to be rated as CAP 4.

4.6 Survey rating

All the tanks/space/area of the ship are divided into the following three types to be rated respectively.

(1) ballast tanks;

(2) cargo tanks/holds (including cofferdams, pump rooms);

(3) external structure (including weather strength deck and hull plating along the full length of the ship).

The tank/space/area average survey rating is calculated as the average of all the same type tank /space/area overall ratings. The hull average survey rating is calculated as the average of the three types overall ratings mentioned above and is rounded as an integer governed by the following rules, namely the survey rating.

The rating of such tank/space/area is not to be better than one higher of the lowest rating of visual inspection, thickness measurement or coating condition for any structural element of such type of any tank/space/area.

The lowest rating of the ballast tanks, cargo tanks/holds and external structure is decisive towards the final result of the survey rating.

4.7 Structural strength rating criteria

4.7.1 Criteria for bending strength rating

The lowest of the deck and bottom rating is decisive towards the rating of bending strength. The bending strength is rated according to Table 4.7.1.

Table 4.7.1

Item	Rating scale			
	CAP 1	CAP 2	CAP 3	CAP 4
Actual section modulus W_{act}	$W_{act} \geq 0.97W$	$0.97W > W_{act} \geq 0.93W$	$0.93W > W_{act} \geq 0.9W$	$W_{act} < 0.9W$

Note: W= hull girder section modulus of "as-built" scantlings or the hull girder section modulus required by current rules.

4.7.2 Buckling strength rating

The lowest of the deck and bottom rating is decisive towards the rating of the buckling strength. The buckling strength is rated according to Table 4.7.2.

Table 4.7.2

Item	Rating scale			
	CAP 1	CAP 2	CAP 3	CAP 4
Buckling utilization factor, η	$\eta \leq 0.90$	$0.90 < \eta \leq 0.95$	$0.95 < \eta \leq 1.0$	$\eta > 1.0$

4.7.3 The lower of the bending and buckling strength rating is decisive towards the rating of the final structural strength rating.

4.8 CAP hull rating

The CAP hull rating is divided into two parts, i.e. survey rating and structural strength rating and will be determined by the rules specified in Table 4.8:

Table 4.8

CAP Hull Rating Scale			
CAP 1	CAP 2	CAP 3	CAP 4
R1=1 and *R2*≤2	*R1*=2 and *R2*≤2	*R1*=3 or *R2*=3	*R1*=4 or *R2*=4

Note: R1= survey rating; R2= structural strength rating

5 Examples for rating calculations (oil tanker)

5.1 For example, tank rating of No.1 Water Ballast Tank (P) is given in Table 5.1.

Table 5.1

Structural Element	Visual	UTM	Coating	Average
Deck	1	1	1	1.0
Side (P)	2	1	1	1.3
Inner hull longitudinal bulkhead (P)	2	1	2	1.7
Centerline girder	2	1	1	1.3

Inner bottom	2	1	1	1.3
Bottom	1	1	1	1.0
Transverse bulkhead (F)	2	1	2	1.7
Transverse bulkhead (A)	2	1	1	1.3
Internal structure	3	2	2	2.3
			Tank average	1.4
			Tank rating	**2**

5.2 Results of ballast tank rating are given in Table 5.2.

Table 5.2

No	Ballast Tanks	Rating
1	Fore Peak Tank	**3**
2	No.1 Water Ballast Tank (P)	2
3	No.1 Water Ballast Tank (S)	2
4	No.2 Water Ballast Tank (P)	1
5	No.2 Water Ballast Tank (S)	2
6	No.3 Water Ballast Tank (P)	1
7	No.3 Water Ballast Tank (S)	1
8	No.4 Water Ballast Tank (P)	1
9	No.4 Water Ballast Tank (S)	1
10	No.5 Water Ballast Tank (P)	1
11	No.5 Water Ballast Tank (S)	1
12	No.6 Water Ballast Tank (P)	1
13	No.6 Water Ballast Tank (S)	1
14	Aft Peak Tank	1
	Ballast Tanks Average	1.4
	Ballast Tanks Rating	**2**

5.3 Results of cargo tanks/holds rating are given in Table 5.3.

Table 5.3

No	Cargo Tanks (including cofferdam, pump room, etc.)	Rating
1	No. 1 Cargo Oil Tank (C)	2
2	No. 2 Cargo Oil Tank (P)	1
3	No. 2 Cargo Oil Tank (S)	1
4	No. 3 Cargo Oil Tank (P)	2
5	No. 3 Cargo Oil Tank (S)	2
6	No. 4 Cargo Oil Tank (P)	1
7	No. 4 Cargo Oil Tank (S)	1
8	No. 5 Cargo Oil Tank (P)	1
9	No. 5 Cargo Oil Tank (S)	1
10	No. 6 Cargo Oil Tank (C)	1
11	Slop Tank (P)	1

12	Slop Tank (S)	1
13	Pump Room	1
	Cargo Tanks Average	1.2
	Cargo Tanks Rating	**1**

5.4 Results of external structure rating are given in Table 5.4.

Table 5.4

No	External Structures	Rating
1	Main Deck Plating	2
2	Side Plating	1
3	Bottom Plating	1
	External Structures Average	1.3
	External Structures Rating	**1**

5.5 Results of survey rating are given in Table 5.5.

Table 5.5

No	Item	Rating
1	Ballast Tanks	**2**
2	Cargo Tanks (including cofferdam, pump room, etc.)	1
3	External Structures	1
	Survey Rating	**2**

5.6 Results of structural strength rating are given in Table 5.6.

Table 5.6

No	Item	Rating
1	Longitudinal Bending Strength	1
2	Longitudinal Buckling Strength	**2**
	Structural Strength Rating	**2**

5.7 Results of CAP hull rating are given in Table 5.7.

Table 5.7

No	Item	Rating
1	Survey Rating	2
2	Structural Strength Rating	2
	CAP Hull Overall Rating	**2**

The final overall CAP hull rating is CAP 2.

Appendix 2 Requirements for Close-up Survey

1 General requirements

1.1 This appendix describes the minimum extent of close-up survey for CAP Hull.

1.2 The condition of structure, coatings and anodes as applicable are to be recorded, especially the extent and scantling of local corrosion and structural defects.

2 Extent for close-up survey

2.1 The requirements for close-up surveys of oil tankers are given in Table 2.1.

Close-up surveys of oil tankers Table 2.1

(1) All complete transverse web frame rings in all ballast tanks (see note 1). (2) All complete transverse web frame rings in a cargo wing tank (see notes 1 and 4). (3) A minimum of 30% of all complete transverse web frame rings in each remaining cargo wing tank (see notes 1, 3 and 4). (4) All complete transverse web frame rings in a cargo oil tank, including deck transverse and cross ties, if fitted (see notes 1 and 5). (5) A minimum of 30% of all complete transverse web frame rings in each remaining cargo oil tank, including deck transverse and cross ties, if fitted (see notes 1 and 5). (6) All transverse bulkheads in all cargo oil tanks and ballast tanks (see note 2). (7) A minimum of 30% of deck and bottom transverse including adjacent structural members in each cargo center tank (see notes 3 and 4). (8) Structural members in fore and aft peak tanks. (9) Structural members in all cofferdams and pump rooms in cargo area. (10) External structure, namely weather strength deck and hull plating along the full length of the ship. (11) "Hot spots" identified from the CAP fatigue strength assessment, if applicable. (12) Possible problem areas identified from examination of class records (see note 6).
Notes: 1 Complete transverse web frame ring includes adjacent structural members. 2 Transverse bulkhead complete includes girder system and adjacent structural members. 3 The 30% is to be rounded up to the next whole integer. 4 Only for single hull oil tanker. 5 Only for double hull oil tanker. 6 If design related fatigue cracks are found, all similar locations are to be close-up surveyed.

2.2 The requirements for close-up surveys of bulk carriers are given in Table 2.2.

Close-up surveys of bulk carriers Table 2.2

(1) All shell frames in all cargo holds, including upper and lower end attachments and adjacent shell plating (see note 1). (2) All cargo holds transverse bulkheads, including internal structure of upper and lower stools, where fitted (see note 2). (3) All inner bottom plating in all cargo holds. (4) All transverse webs with associated plating and longitudinals in each water ballast tank (see note 3). (5) All transverse bulkheads in ballast tanks, including stiffening system (see note 2). (6) All ordinary transverse web frames in all double side tanks (see note 4). (7) All cargo hold hatch covers and coamings (plating and stiffeners). (8) All deck plating and under deck structure inside line of hatch openings between all cargo holds hatches. (9) Structural members in fore and aft peak tanks. (10) Structural members in all cofferdams in cargo area. (11) External structure, namely weather strength deck and hull plating along the full length of the

ship. (12) "Hot spots" identified from the CAP fatigue strength assessment, if applicable. (13) Possible problem areas identified from examination of class records (see note 5).
Notes: 1 Only for single side skin bulk carrier. 2 Close-up Survey of to be carried out at four levels: ① immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for transverse bulkheads without lower stool; ② immediately above and below the lower stool shelf plate (for transverse bulkheads with lower stools), and immediately above the line of the shedder plates; ③ about mid-height of the bulkhead; ④ immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools, or immediately below the topside tanks. 3 Transverse web frame in topside, hopper side and double side ballast tanks (double side skin bulk carrier). In fore and aft peak tanks transverse web frame means a complete transverse web frame ring including adjacent structural members. 4 Only for double side skin bulk carriers. 5 If design related fatigue cracks are found, all similar locations are to be close-up surveyed.

2.3 The requirements for close-up surveys of liquefied gas carriers are given in Table 2.3.

Close-up surveys of liquefied gas carriers Table 2.3

For ships having independent tanks of type C, with a midship section similar to that of a general cargo ship: (1) All frames in all cargo holds (see note 1); (2) All transverse bulkheads of all cargo holds (see note 2); (3) All transverse web frames in all ballast tanks (see note 3); (4) All ordinary transverse frames for transverse framing system in all ballast tanks (see note 4); (5) All transverse bulkheads of all ballast tanks (see note 5); (6) Structural members in fore and aft peak tanks; (7) External structure, namely weather strength deck and hull plating along the full length of the ship; (8) All inner bottom plating of all cargo holds; (9) All bottom floors in all cargo holds (note 6); (10) All deck plating and under deck structure inside line of hatch openings between all cargo hold hatches; (11) All cargo hold hatch coamings (plating and stiffeners); (12) Structural members in all cofferdams, pump rooms and other spaces (excluding fuel oil tank) in the cargo tank area (where applicable); (13) Saddle structures (note 7); (14) "Hot spots" identified from the CAP fatigue strength assessment, if applicable; (15) Possible problem areas identified from examination of class records (see note 8).
Notes: 1. Frames in cargo holds include end attachments and adjacent shell plating. 2. Transverse bulkhead includes girder/stiffener systems. 3. Transverse web frame includes adjacent structural members. 4. Ordinary transverse frames include frames and beams and end attachments and adjacent structural members. 5. Complete transverse bulkheads include girder systems and adjacent structural members, and adjacent longitudinal bulkhead structures. 6. Bottom floors of single bottom ships include stiffener systems and adjacent structural members. 7. Saddle structure includes stiffener systems and adjacent structural members. 8. If cracks are found, all similar locations are to be close-up surveyed.

2.4 The requirements for close-up surveys of chemical tankers are given in Table 2.4.

Close-up surveys of chemical tankers **Table 2.4**

(1) All web frame rings in all ballast tanks (see note 2).
(2) All web frame rings in a cargo wing tank (see note 2).
(3) One web frame ring in each remaining cargo tank (see note 2).
(4) All transverse bulkheads in all cargo tanks (see note 3);
(5) All transverse bulkheads in all ballast tanks (see note 3);
(6) Internals in fore and aft peak tanks (see note 1);
(7) Internals in all cofferdams in the cargo area;
(8) External structure, namely weather strength deck and shell plating along the full length of the ship;
(9) "Hot spots" identified from the CAP fatigue strength assessment, if applicable;
(10) Suspect areas identified from examination of class records (see note 4).
Notes: 1. Complete tanks, including all tank boundaries and internal structures, as well as external structure on deck in way of the tank. 2. Complete transverse web frame ring, including adjacent structural members. Web frame rings in cargo tanks mean deck transverse, vertical stiffeners of longitudinal bulkheads (if fitted), including adjacent structural members. 3. Transverse bulkhead complete, including girder system and adjacent structural members. 4. If cracks are found, all similar locations are to be close-up surveyed.

Appendix 3 Requirements for Thickness Measurement

1. Extent of thickness measurement

1.1 Extent of thickness measurement for oil tankers

1.1.1 At least three transverse sections within the cargo area, among them, one in the amidship. The transverse sections are to be located where the largest thickness reductions are suspected to occur or are revealed from deck plating measurements and are to be, as far as possible, clear of areas which have been locally renewed or reinforced. The complete section is to be measured, including:

(1) within 0.1*D* (where *D* is the ship's moulded depth) of the deck and bottom, a minimum of one point is to be measured on each plate between longitudinals, and each longitudinal and girder is to be measured on one point of the web and faceplate;

(2) for areas other than those of the above mentioned deck and bottom, each strake is to be measured on one point, and each longitudinal and girder is to be measured on one point of the web and faceplate.

(3) The primary structural members required to measure the thickness within each transverse section are to include main deck, deck longitudinal, deck girder, longitudinal bulkhead and its longitudinal and girder, side shell plating, side shell longitudinal, side girder, bottom plating, bottom longitudinal, bottom girder, inner-bottom plating, inner-bottom longitudinal, sloping plate of hopper tank and its longitudinal.

1.1.2 Five points are to be measured on each plate for:

(1) areas of all exposed main deck plating along the full length of the ship;

(2) bottom plating along the full length of the ship;

(3) all wind and water strakes along the full length of the ship;

(4) areas of all inner bottom plating within the cargo area.

1.1.3 two points are to be measured on each plate for:

(1) areas of all continuous longitudinal bulkheads within the cargo area;

(2) ship side shell plating other than wind and water strakes (including sea chest);

(3) areas of all hopper tank slope plating within the cargo area;

(4) continuous longitudinal stringers.

1.1.4 Cargo oil tanks

1.1.4.1 Web frame rings

All complete web frames in a selected cargo oil wing tank. A minimum of 30% of all complete web frames in each remaining cargo oil tank (at least 3). Each web frame and adjacent structures are to be measured according to the following requirements:

(1) one measurement each on the web and faceplate for longitudinals and other stiffeners;

(2) two measurements each on platform plating and associated structural members;

(3) two measurements each on the web and faceplate for girders;

(4) transverse webs, including faceplate, stiffeners and brackets.

1.1.4.2 Transverse bulkhead

Transverse bulkhead and associated structural members, including swash bulkheads, and internal structure of upper and lower stools, where fitted.(plates and stiffeners at three horizontal levels).

1.1.5 Each ballast tank:

(1) all transverse webs including adjacent structural members;

(2) all transverse bulkheads including girder systems and adjacent structural members.

1.1.6 Internal structural members in fore and aft peak ballast tanks:

(1) all transverse web with associated plating and stiffeners ;

(2) selected beams and frames;

(3) platform plating and associated structures;

(4) watertight transverse bulkhead and its stiffener, including swash bulkheads and chain locker bulkhead.

1.1.7 For cofferdams, pump rooms and other spaces in the cargo area, representative thickness measurements for all main structural elements are required.

1.1.8 Representative exposed superstructure deck plating (poop, bridge, and forecastle deck).

1.1.9 Extent of measurements may be increased as considered necessary by the attending CAP inspector.

1.1.10 Additional measurements are to be carried out if one or more readings indicate corrosion exceeding requirement to CAP 2 (substantial corrosion, 75% of allowable margin) in accordance with the requirements in PART ONE of current ISC Rules for Classification of Sea-going Steel Ships (hereinafter referred to as “Steel Ship Rules”).

1.2 Extent of thickness measurement for bulk carriers

1.2.1 At least three transverse sections within cargo length area, among them, one in the amidship. The transverse sections are to be located where the largest thickness reductions are suspected to occur or are revealed from deck plating measurements and are to be, as far as possible, clear of areas which have been locally renewed or reinforced.

The primary structural members required to measure the thickness within each transverse section are to include main deck, deck longitudinal, deck girder, longitudinal bulkhead and its longitudinal and girder, side shell plating, side shell longitudinal side girder, bottom plating, bottom longitudinal, bottom girder, inner-bottom plating, inner-bottom longitudinal, sloping plate of topside tank and its longitudinal, bottom plate of topside tank, sloping plate of hopper tank and its longitudinal.

1.2.2 Five points are to be measured on each plate for:

(1) areas of all exposed main deck plating along the full length of the ship;

(2) all bottom plating along the full length of the ship;

(3) all wind and water strakes along the full length of the ship;

(4) areas of all inner bottom plating within the cargo area.

1.2.3 two points are to be measured on each plate for:

(1) areas of all continuous longitudinal bulkheads within the cargo area;

(2) ship side shell plating other than wind and water strakes (including sea chest);

(3) areas of all hopper tank and top side tank slope plating within the cargo area;

(4) continuous longitudinal stringers.

1.2.4 transverse bulkhead and associated structural members of all cargo holds, including swash bulkheads, and internal structure of upper and lower stools, where fitted.(plates and stiffeners at three horizontal levels).

1.2.5 Each ballast tank:

(1) all transverse web with associated plating and longitudinal stiffeners;

(2) all transverse bulkheads and stiffening system.

1.2.6 For single side skin bulk carriers, all shell frames in all cargo holds, including upper and lower end attachments and adjacent shell plating.

1.2.7 For double skin bulk carriers, all ordinary transverse frames for transverse framing system or all of longitudinals for longitudinal framing system on side shell and inner side plating at forward, middle and aft parts, in all double side tanks.

1.2.8 Internal structural members in fore and aft peak ballast tanks:

(1) all transverse web with associated plating and stiffeners;

(2) selected beams and frames;

(3) platform plating and associated structures;

(4) watertight transverse bulkhead and its stiffener, including swash bulkheads and chain locker bulkhead.

1.2.9 For cofferdams, pump rooms and other spaces in the cargo area, representative thickness measurements for all main structural elements are required.

1.2.10 All cargo hold hatch covers and coamings (plating and stiffeners).

1.2.11 All deck plating and under deck structure inside line of hatch openings between all cargo holds hatches.

1.2.12 Representative exposed superstructure deck plating (poop, bridge, and forecastle deck).

1.2.13 Extent of measurements may be increased as considered necessary by the attending CAP inspector.

1.2.14 Additional measurements are to be carried out if one or more readings indicate corrosion exceeding requirement to CAP 2 (substantial corrosion, 75% of allowable margin) in accordance with the requirements in PART ONE of current ISC Steel Ship Rules.

1.3 Extent of thickness measurement for liquefied gas carriers (Having independent tanks of type C, with a midship section similar to that of a general cargo ship)

1.3.1 At least three transverse sections are to be measured within cargo length area, among them, one is at the amidship. The transverse sections are to be located where the largest thickness reductions are suspected to occur or are revealed from deck plating measurements and are to be, as far as possible, clear of areas which have been locally renewed or reinforced. The complete section is to be measured, including all longitudinal continuous members, including but not limited to main deck, deck longitudinal, deck girder, side plating, side longitudinal, side girder, bottom plating, bottom longitudinal, bottom girder, inner-bottom plating, inner-bottom longitudinal, sloping plate of hopper tank and its longitudinal, longitudinal bulkhead plating and its longitudinals and longitudinal stringers, etc.

1.3.2 Five points are to be measured on each plate for:

(1) all exposed main deck plating along the full length of the ship;

(2) all bottom plating along the full length of the ship;

(3) all wind and water strakes along the full length of the ship;

(4) all inner bottom plating of all cargo holds.

1.3.3 two points are to be measured on each plate for:

(1) ship shell plating other than wind and water strakes (including sea chest);

(2) all longitudinal bulkheads including hopper tank sloping plating within the cargo area;

(3) all continuous longitudinal stringers.

1.3.4 All cargo holds:

(1) all cargo hold frames, including face plates, brackets and adjacent shell plating are to be measured according to the following requirements:

①one measurement each on the web and faceplate for longitudinals;

②two measurements each on the web and faceplate for girders.

(2) for all transverse bulkheads and girder/stiffener system, plates and stiffeners are to be measured at three horizontal levels.

(3) all deck plating and under deck structures inside line of hatch openings between all cargo hold hatches.

(4) all cargo hold hatch coamings (plating and stiffeners).

(5) all bottom floors (applicable to single bottom ship).

1.3.5 All ballast tanks:

(1) all transverse webs including adjacent structural members;

(2) all ordinary frames for transverse framing system, including ordinary frames and beams and end attachments and adjacent structural members.

(3) all transverse bulkheads including girder system and adjacent structural members, and adjacent longitudinal bulkhead structures.

1.3.6 Internal structural members in fore and aft peak ballast tanks:

(1) all transverse webs with associated plating and stiffeners ;

(2) selected beams and ordinary frames;

(3) platform plating and associated structures;

(4) watertight transverse bulkhead and its stiffener, including swash bulkheads and chain locker bulkhead.

1.3.7 Duck keels and internal structural members in the cargo area.

1.3.8 For cofferdams, pump rooms and other spaces in the cargo area (excluding cargo oil tanks), representative thickness data for main structural elements are required (where applicable).

1.3.9 Representative exposed superstructure deck plating (poop, bridge, and forecastle deck).

1.3.10 Saddle structure, including stiffener system and adjacent structural members.

1.3.11 Extent of measurements may be increased as considered necessary by the attending CAP inspector.

1.3.12 Additional measurements are to be carried out if one or more readings indicate corrosion exceeding requirement to CAP 2 (substantial corrosion, 75% of allowable margin) in accordance with the requirements in PART ONE of current ISC Steel Ship Rules).

1.4 Extent of thickness measurement for chemical tankers

1.4.1 At least three transverse sections are to be measured within cargo length area, and one of them is to include a ballast tank within 0.5L amidships.. The transverse sections are to be located where the largest thickness reductions are suspected to occur or are revealed from deck plating measurements and are to be, as far as possible, clear of areas which have been locally renewed or reinforced. The complete section is to be measured, including:

(1) within 0.15*D* (where *D* is the ship's moulded depth) of the deck and bottom, a minimum of one point is to be measured on each plate between longitudinals, and each longitudinal and girder is to be measured on one point of the web and faceplate;

(2) for areas other than those of the above mentioned deck and bottom, each strake is to be measured on one point, and each longitudinal and girder is to be measured on one point of the web and faceplate.

(3) The primary structural members required to measure the thickness within each transverse section are to include main deck, deck longitudinal, deck girder, longitudinal bulkhead and its stiffener, side shell plating, side shell longitudinal, side girder, bottom plating, bottom longitudinal, bottom girder, inner-bottom plating, inner-bottom longitudinal, sloping plate of hopper tank and its longitudinal.

1.4.2 Five points are to be measured on each plate for:

(1) all exposed main deck plating along the full length of the ship;

(2) all bottom plating along the full length of the ship;

(3) all wind and water strakes along the full length of the ship;

(4) all inner bottom plating within the cargo area.

1.4.3 Two points are to be measured on each plate for:

(1) areas of all continuous longitudinal bulkheads within the cargo area (including hopper tank sloping plating);

(2) ship side shell plating other than wind and water strakes (including sea chest);

(3) two measurements each on the web and faceplate for longitudinal girders in cargo tanks;

(4) continuous longitudinal stringers.

1.4.4 At least three transverse web frame rings, fore, middle and aft, in each cargo tank are to be selected (only two transverse web frame rings are required for a cargo tank less than 15 m in length). Each web frame ring and adjacent structures are to be measured according to the following requirements:

(1) one measurement each on the web and faceplate for longitudinals and other stiffeners;

(2) transverse webs, including faceplate, stiffeners and brackets;

(3) for transverse bulkhead and associated structural members, including swash bulkheads, and internal structure of upper and lower stools, where fitted, plates and stiffeners are to be measured at three horizontal levels.

1.4.5 Each ballast tank:

(1) all transverse webs with associated plating and longitudinals;

(2) all transverse bulkheads and stiffening system.

1.4.6 Internal structural members in fore and aft peak ballast tanks:

(1) all transverse webs with associated plating and stiffeners；

(2) selected beams and frames;

(3) Tank top deck and girders and associated structures.

(4) platform plating and associated structures;

(5) watertight transverse bulkheads and stiffeners, including swash bulkheads and chain locker bulkhead.

1.4.7 For cofferdams, pump rooms and other spaces in the cargo area, representative thickness data for all main structural elements are required.

1.4.8 Representative exposed superstructure deck plating (poop, bridge, and forecastle deck).

1.4.9 Extent of measurements may be increased as considered necessary by the attending CAP inspector.

1.4.10 Additional measurements are to be carried out if one or more readings indicate corrosion exceeding requirement to CAP 2 (substantial corrosion, 75% of allowable margin) in accordance with the requirements in PART ONE of current ISC Steel Ship Rules.

2 Reduction of measuring points

2.1 In no case are measuring points on exposed main deck plating, shell plating, inner bottom plating as specified in 1.1 (2), 1.2 (2), 1.3 (2) and 1.4(2) and transverse sections as specified in 1.1(1) , 1.2(1), 1.3(1) and 1.4(1) to be reduced.

2.2 Only in the following cases and subject to agreement of the CAP Inspector may the required measuring points be reduced as appropriate:

(1) the structural member is made of stainless steel, excluding stainless clad steel plating; or

(2) the coating of both sides of the structural member during construction is well kept; or

(3) located within fuel or cargo tank(s) and representative thickness measurements reveal no or negligible steel loss, well within the requirements for CAP 1 (less than 33 % of allowable margin). The representative measurements are to be taken in areas expected to represent worst case corrosion.

2.3 Where reduction of measuring points is allowed, at least ten points are to be measured as representative measurements on each primary member required for measurement within each tank/space, and at least five points to be measured as representative measurements on each secondary member. If corrosion at any points of representative measurements is found to be higher than CAP1 (greater than 33 % of allowable margin), an overall measurement is to be performed in accordance with 1.1, 1.2, 1.3 and 1.4 above in the tank/space involved.

2.4 Reduction of measuring points in accordance with 2.of this Appendix is to be indicated in the thickness measurement report and CAP report at the discretion of CAP inspector.

Appendix 4 Requirements of RIGHTSHIP-CAP (for Bulk Carriers)[①]

1 RIGHTSHIP-CAP for hull structure

1.1 The fatigue analysis is to be carried out.

1.2 For all hull structures (including plating, primary and secondary members), RightShip-CAP2/5 requires readings better than 65% of the maximum permissible diminution. RightShip-CAP2/3 requires readings better than 75% of the maximum permissible diminution. A corrosion pattern with measurements higher than 75% of the maximum permissible diminution ("substantial corrosion") is not accepted.

1.3 Requirements for coating are given in Table 1.3.

Table 1.3

Tank/areas	Rating required	Standard applied
	RIGHTSHIP-CAP 2/5 & 2/3	
Ballast tank	Rating of "Good", or "Fair" where anodes are installed	IACS
Cargo hold*	Rating of "Good"	

Note* RIGHTSHIP-CAP has no requirement for coating of tank tops and including to 300 mm below the side shell frames lower bracket toes.

2. RIGHTSHIP-CAP for deck machinery

The following inspection items are to be supplemented in addition to those specified in the Guidelines.

2.1 All windlass and winch brakes are subject to brake test under safe working load. The test is to be witnessed by CAP inspector. Where the test results are satisfactory, a statement of compliance is to be issued by CAP inspector and retained onboard the ship.

2.2 Safe Working Load is to be indicated for bollards and guide rollers.

2.3 All hydraulic pipe work for hatch covers must be well coated with no active corrosion.

① This appendix is for reference and is subject to official publication.

Appendix 5 CAP Machinery Rating Methodology

1 General

1.1 This appendix describes the related aspects and standards of MCAP rating.

1.2 MCAP rating is carried out based on the checklist in appendix 6 of the Guidelines. The checklist includes 17 parts, namely main engine, generating set prime mover, shafting, steering gear, boiler, compressed air system, piping system[①], electrical installations, liquid cargo machinery, liquid cargo piping, inert gas system, lifting appliances of engine room, automation, windlass and winch, deck lifting appliances, hatch cover operating system and survival craft and launching arrangements. The items necessary for inspection are to be selected, as appropriate, and to rate the system/equipment individually according to the following regulations. The overall rating of MCAP is determined after comprehensive consideration of the ratings of system/equipment. The final rating of MCAP is determined by CAP rating committee.

2 Rating of system/equipment

2.1 Rating of system/equipment is carried out based on the results of site inspection, tests and relevant testing. Different inspection/test is to be carried out based on different system/equipment, see Table 2.1. Details of the inspection/testing items are given in Appendix 6 of the Guidelines.

Table 2.1

Item	Check of documents and records	Visual inspection	Function test	Collection and measurement of machinery parameters	Vibration measurement	Oil sample analysis
Main engine	√	√	√	√	√	√
Generating set prime mover	√	√	√	√	√	√
Shafting[②]		√	√	√	√	√
Steering gear		√	√		√	√
Boiler	√	√	√			
Compressed air system		√	√		√	
Piping system[①]		√	√		√	
Electrical installations		√	√	√		
Liquid cargo machinery		√	√	√	√	√
Liquid cargo piping	√	√	√			
Inert gas system	√	√	√			
Lifting appliances of engine room		√	√			
Automation		√	√			
Windlass and winch[③]	√	√	√			√
Deck lifting appliances[③]	√	√	√			√
Hatch cover operating system[③]	√	√	√			√
Survival craft and launching arrangements[③]	√	√	√			√

① meaning piping systems other than the systems and piping systems listed in this table.

② If there is no applicable standard for checking shafting vibration caused by low speed of main engine, shafting vibration test may not be carried out.

③ Where windlass and winch, deck lifting appliances, hatch cover operating system, survival craft and launching arrangements are not fitted with hydraulic operating system, no oil sample analysis is required.

2.2 Rating of each inspection/test are given as follows according to the results of the inspections:

Very good: 3

Good: 2

Fair: 1

Poor: 0 (not satisfying the class requirements).

2.3 According to the results of check of documents and records, visual inspection, function test, collection and measurement of machinery parameters, vibration measurement, oil sample analysis, taking account of the weighting of the items, total point A of the system/equipment is determined. The rating of the system/equipment is given according to total point A and Table 2.3.

Table.2.3

Rating scale	Points
Rating 1	2.75≤A≤3, in very good condition, found with no deficiencies affecting safe operation and/or performance. No repair required. Documentation and maintenance records are complete.
Rating 2	2≤A<2.75, in good condition，found with some minor deficiencies which do not affect safe operation and/or normal performance. No immediate repair considered necessary. Documentation and maintenance records are complete.
Rating 3	1≤A<2, in acceptable condition, found with deficiencies not affecting safe operation and/or performance. Some maintenance and repair may be considered necessary. Documentation and maintenance records are complete.
Rating 4	Rating point of any item is 0, found with deficiencies significantly affecting operation and/or performance. Repair required to reinstate serviceability.

3 Overall rating

3.1 The overall rating of MCAP is given based on the rating of the ship's applicable system/equipment according to the following requirements:

Rating 1 Rating 1 is given for main engine, generating set prime mover, shafting, steering gear and boiler. For other equipment/system, rating 2 is given at least;

Rating 2 Not lower than rating 2 is given for all system/equipment;

Rating 3 Not lower than rating 3 is given for all system/equipment;

Rating 4 Rating 4 is given for any system/equipment.

Appendix 6 Checklist of MCAP

No.	Survey items	Survey requirements/data collection
1	**Main Engine**	
1.1	Performance	Check, measure and record engine data (use *T*/*C* rpm to get at least 80% MCR)
1.2	Piston lubricator	Check function
1.3	Engine starting ability	Check starting air pressure before and after start Δp =
1.4	Scavenging air cooler drain valve	Check and verify function
1.5	Auxiliary blowers	Check function, record scavenging air pressure when auxiliary blower(s) are running. *p*scav-a.b.=
1.6	Engine frame (foundation and chassis)	Check for cracks
1.7	Tie and foundation bolts	Check for loose, broken bolts
1.8	Piston and piston rings	Check wear from history file
1.9	Cylinder liners	Check wear from history file
1.10	Rod, crosshead bearings and guides	Check wear from history file
1.11	Crank bearings	Check wear from history file
1.12	Main bearings	Check wear from history file
1.13	Camshaft bearings/shaft/cams	Check for pittings. Check wear from history file
1.14	Register wheel/chains	Check wear from history file
1.15	Turbo shaft/bearings	Check wear from history file
1.16	Leakage of flammable fluids	Check for leaks
1.17	Lub. and turbo oil for main engine system	Oil sample
2	**Remote Control of Main Engine**	
2.1	Remote engine control (bridge)	Check and verify function
2.2	Remote engine control (engine control room)	Check and verify function
2.3	Local engine control	Check and verify function
3	**Safety Device of Main Engine**	
3.1	Shielding of high pressure fuel lines	Check shielding
3.2	Low lubrication oil pressure shut down	Check alarm/shut down
3.3	Overspeed shut down (if applicable)	Check alarm/shut down or check of log book
3.4	Cylinder cooling slow down	Check alarm/slow down or check of log book
3.5	Piston cooling low flow slow down	Check alarm/slow down or check of log book
3.6	Scavenging air belt temperature slow down	Check alarm/slow down or check of log book
3.7	Crankcase bearing temperature or oil mist concentration high slow down	Check alarm/slow down or check of log book
3.8	Function test for leakage alarm of high pressure fuel lines	Check alarm or check of log book
3.9	Function test for automatic slow down of main engine exhaust temperature deviation	Check alarm/slow down or check of log book

No.	Survey items	Survey requirements/data collection
3.10	Crankcase safety valves	Check PMS or history record
3.11	Cylinder safety valves	Check PMS or history record
4	**Monitoring of Main Engine**	
4.1	Local exhaust temperature monitoring equipment	Check function, record the damaged sensors and measure the temperature
4.2	Local fuel temperature before engine monitoring equipment	Check function
4.3	All other local temperature monitoring equipment	Check function, record the damaged sensors and measure the temperature
4.4	Engine control room monitoring and alarm system	Check function, record the damaged sensors and measure the values
5	**Shafting**	
5.1	System functionality	Check function and confirmation
5.2	Thrust bearing	Check bearing temperature
5.3	Intermediate bearing	Check bearing temperature
5.4	Stern tube bearing	Check bearing temperature
5.5	Stern gland	Check for leaks
5.6	CP Propeller servo oil	Oil sample
5.7	Reduction gearbox	Check for scuffing, pitting and cracks. Vibration measurements
5.8	Gear oil	Oil sample
5.9	Stern tube oil	Oil sample
5.10	Automatic slow down or shut down at high thrust bearing temperature	Check alarm/slow down/shut down or check of log book
5.11	Automatic shut down at low gear lub. Oil pressure	Check alarm/shut down or check of log book
5.12	Automatic start of standby gear oil pump at low pressure	Check alarm/automatic start or check of log book
5.13	Automatic start of standby CP propeller servo oil pump at low pressure	Check alarm/automatic start or check of log book
6	**Steering Gear**	
6.1	System functionality	Check time to turn rudder from 35 deg starboard to 30 deg port and vice versa. Check for liquid hammers, check for leaks, and check for vibration.
6.2	Hydraulic pumps	Check and verify function
6.3	Hydraulic oil	Oil sample
6.4	Low level alarm in steering gear header tank	Check alarm/shut down or check of log book
6.5	Emergency steering	Emergency steering take-over test, check and verify communication with bridge
7	**Side thruster**	
7.1	System functionality	Verify operability
7.2	Oil pumps	Vibration measurement
7.3	Hydraulic oil	Oil sample
7.4	Low level alarm in header tank	Check alarm/shut down or check of log book

No.	Survey items	Survey requirements/data collection
8	**Generating set prime mover**	
8.1	Performance	Check, measure and record data of generating set prime mover (The power of the generator set is at least 80% of its rated power)
8.2	Starting ability of generating set prime mover	Check and verify starting ability
8.3	Shielding of high pressure fuel lines	Check shielding
8.4	Leakage of flammable fluids	Check for leaks
8.5	System lub. oil	Oil sample
9	**Electric Power Distribution**	
9.1	Main switchboard	Verify operability. Check inside of the switchboard for cleanliness
9.2	Cables	Check for loose cabling and poor insulation
9.3	Cable trays and clamping	Check integrity and loose
9.4	Insulation test for lighting and power circuits	Insulation measurement or check record
10	**Emergency Power Generation and Transfer**	
10.1	System functionality	Check and verify automatic start up of emergency power diesel engine and connection to distribution network
10.2	24 V system functionality	Check and verify function
10.3	Leakage of flammable fluids	Check for leaks
11	**Generating set prime mover and Transfer Safety Functions**	
11.1	Low lubrication oil pressure shut down	Check alarm/shut down or check of log book
11.2	Overspeed shut down	Check alarm/shut down or check of log book
11.3	Automatic start of standby generating set prime mover	Verify automatic start
11.4	Load sharing	Check and verify function
11.5	Local exhaust temp. monitoring equipment	Check function, record the damaged sensors and measure the temperature
11.6	Local fuel temp. before engine monitoring equipment	Check function
11.7	All other local temp. monitoring equipment	Check function, record the damaged sensors and measure the temperature
11.8	Engine control room monitoring and alarm system	Check function, record the damaged sensors and measure the temperature
11.9	Local control of generating set prime mover	Check and verify function
11.10	Engine control room control of generating set prime mover	Check and verify function
11.11	Generators	Check, measure and record data
12	**Ventilation**	
12.1	Skylight/engine room hatch functionality	Check and verify function
12.2	Engine room fans functionality	Check and verify function
12.3	Operation of ventilation	Check and verify function
12.4	Automatic stop of fans in case of CO2 alarm	Check function and verification test

No.	Survey items	Survey requirements/data collection
12.5	Closing tightness of engine room fans and roller blinds	Check and verify function
13	**Exhaust Gas System**	
13.1	Exhaust leaks	Check for leaks
13.2	Exhaust pipe supporting	Check supporting and vibration measurement
13.3	Insulated heated surfaces, ME	Check integrity
13.4	Insulated heated surfaces, generating set prime mover	Check integrity
13.5	Insulated heated surfaces, Boilers, and exhaust piping	Check integrity
14	**Boiler or Steam Generation**	
14.1	System functionality	Check, measure and record data
14.2	Automatic system for boiler burner	Check automatic function
14.3	Steam pipe supporting in engine room	Check supporting and vibration measurement
14.4	Insulation and shielding of steam pipes in engine room	Check integrity of insulation
14.5	System leaks	Check and test for leaks of piping
14.6	Boiler water treatment and testing	Check PMS or history record
14.7	Low water level	Check alarm/shut down or check of log book
14.8	Water circulation stop	Check alarm/shut down or check of log book
14.9	Combustion air supply stop	Check alarm/shut down or check of log book
14.10	Steam pressure high	Check alarm/shut down or check of log book
14.11	Uptake temperature high	Check alarm/shut down or check of log book
14.12	Flame failure	Check alarm/shut down or check of log book
14.13	Boiler safety valves	Verify set point or check class report
14.14	Boiler feed water system	
14.14.1	System functionality	Check, measure and record relevant data of the system
14.14.2	Feed water pump	Check and verify the function
14.14.3	Wear of feed water pump	Check vibration
14.14.4	Feed water piping and supporting	Check supporting and vibration
14.14.5	Sealing and leakage of pump shaft	Check for leakage and the extent of leakage
15	**Fuel Oil System**	
15.1	System functionality	Check, measure and record data
15.2	Fuel tank drain valves	Check and verify function
15.3	Purifier inlet temp	Measure and record, T_{inlet} =
15.4	Purifier functionality	Check and verify function
15.5	Purifier wear	Vibration measurement

No.	Survey items	Survey requirements/data collection
15.6	Booster pump functionality	Verify function, measure the delivery pressure , P_{outlet} =
15.7	Booster pump wear	Vibration measurement
15.8	Viscosity control	Check viscosity/ temperature before all high pressure pumps and verify operability of viscosity controllers
15.9	Viscosity before high pressure pumps on diesel engines	Check and record
15.10	Fuel oil piping and supporting within engine room	Check supporting and vibration measurement
15.11	Oil leaks	Check for leaks
15.12	Automatic start up of standby booster pump	Check function, verify automatic starting
15.13	Fuel tank drip trays	Check integrity and smoothness
15.14	Quick closing of fuel tanks	Check and verify function
16	**Sea Water Cooling System**	
16.1	System functionality	Check, measure and record data
16.2	Sea water intakes	Verify operability of all intakes. SW suction pressure, $P_{suction}$=
16.3	Sea water pumps	Check and verify function, SW delivery pressure, P_{outlet} =
16.4	Sea water pumps wear	Vibration measurement
16.5	Sea water piping and supporting	Check supporting and vibration measurement
16.6	Pump shaft seal and leakage	Check for leakage and the extent of leakage
17	**Fresh Water Cooling System**	
17.1	System functionality	Check, measure and record data
17.2	Fresh water pumps	Check and verify function
17.3	Fresh water pumps wear	Vibration measurement
17.4	Fresh water piping and supporting	Check supporting and vibration measurement
17.5	Pump shaft seal and leakage	Check for leakage and the extent of leakage
17.6	Automatic start up of standby fresh water pump	Check function, verify automatic starting
18	**Lubrication Oil System**	
18.1	System functionality	Check, measurement and record data
18.2	ME Filters	Check function, measure the pressure difference of outlet and inlet, P_{diff} =
18.3	Generating set prime mover filters	Check function, measure the pressure difference of outlet and inlet, P_{diff} =
18.4	Purifier inlet temp	Measure the inlet temperature, T_{inlet} =
18.5	Purifier functionality	Check, measure and record data
18.6	Purifier wear	Vibration measurement
18.7	ME LO pump functionality	Check function, measure the delivery pressure, P_{outlet}=
18.8	AE LO pump functionality	Check function, measure the delivery pressure, P_{outlet} =

No.	Survey items	Survey requirements/data collection
18.9	LO pump wear	Vibration measurement
18.10	Lubricating oil piping and supporting within engine room	Check supporting and vibration measurement
18.11	Oil leaks	Check for leaks
18.12	Automatic start up of standby LO pump	Check function and verify automatic starting
18.13	Quick closing of lubrication tanks	Check and verify function
19	**Compressed Air system**	
19.1	Starting air compressors and air receiver	Function test, check for abnormal running
19.2	Automatic start up of starting air compressors	Function test and verification
19.3	Air leaks in starting air system	Check for leaks and the extent of leaks
19.4	Control air compressor	Function verification, check for abnormal running
19.5	Service air compressor	Function verification, check for abnormal running
19.6	Air compressor wear	Vibration measurements on all air compressors
19.7	Compressed air piping and supporting	Check supporting and vibration measurement
19.8	Starting air receiver safety valve	Verify set point or check class report
19.9	Service air receiver safety valve	Verify set point or check class report
19.10	Control air receiver safety valve	Verify set point or check class report
20	**Loading/Unloading System of Cargo Oil**	
20.1	Performance	Check, measure, and record the discharged, suction pressure, delivery pressure, and density of cargo oil, etc.
20.2	Valve operation	Function verification
20.3	Emergency valve operation	Function verification
20.4	Hydraulic pump station for remote control valve	Function verification
20.5	Hydraulic oil within hydraulic system	Oil sample
20.6	Lub. oil for driving turbine	Oil sample
20.7	Stripping system functionality	Function verification, or check Oil Record Book, and capacity of slop tank V
20.8	Segregation of ballast and cargo system	Check and confirm means and devices
20.9	Vapour control system	Check, verify and record function and data
20.10	Cargo piping and supporting	Check supporting and vibration measurement
20.11	Cargo and booster pump wear	Vibration measurement
20.12	Driving turbine wear	Vibration measurement
20.13	Cargo pump bearing	Bearing temp. T =
20.14	Cargo spaces/pump room ventilation systems	Check and verify function
20.15	Cargo gauging system	Check and verify function
20.16	Cargo leaks	Check for leaks, function test for leakage alarm of cargo

No.	Survey items	Survey requirements/data collection
		pump shaft seal (if any)
20.17	P/V valves	Check and verify function
20.18	Ventilators and vent pipes	Check and verify function
20.19	High level alarms for cargo tanks	Check alarm or check of log book
20.20	Emergency shut down	Check and verify function
21	**Cargo Storage and Treatment**	
21.1	Inert gas plant (including scrubber, water seals and non-return devices)	Check and verify function, check all parts for corrosion
21.2	Inert gas blowers	Check and verify function
21.3	Inert gas plant safety functions	Check important alarms or check of log book
21.4	Hatches and cargo tank openings	Function verification, tightness test, use inert gas pressure of about 1000 mm WC
21.5	Tank heating system	Function verification, check for oil in return line
22	**Tank Cleaning**	
22.1	Tank cleaning devices	Check and verify function and integrity
22.2	COW machines	Function check and verification
22.3	Tank washing heater	Function check and verification
22.4	COW piping	Check function, supporting and leaks, etc.
22.5	Monitoring and Control of Cargo Oil Systems	Function check and verification
22.6	Local instrumentations	Function check and verification
22.7	Instrumentation in cargo control room	Function check and verification
22.8	Remote control of cargo systems	Function check and verification
23	**Bilge and Oily Water Handling**	
23.1	System functionality	Function check and verification
23.2	Bilge wells and high level alarms	Verify suction from all wells, check alarms or check of log book
23.3	Bilge pumps	Function check and verification
23.4	Bilge pump wear	Vibration measurement (centrifugal pump only)
23.5	15 ppm separator	Function check and verification
23.6	15 ppm alarm	Check alarm
23.7	Bilge water piping and supporting	Check support and vibration measurement
23.8	Bilge pump shaft seal and leakage	Check for leakage and the extent of leakage
23.9	Oil discharge monitoring device	Function check and verification
24	**Ballasting**	
24.1	System functionality	Function check and verification
24.2	Sea inlet valves and overboard valves	Verify operability of all intakes and overboard valves

No.	Survey items	Survey requirements/data collection
24.3	Ballast pumps wear	Vibration measurement
24.4	Ballast water piping and supporting	Check supporting and vibration measurement
24.5	Ballast pump shaft seal and leakage	Check for leakage and the extent of leakage
25	**Detection and alarm**	
25.1	Fire alarms	Test for alarm or check of log book
25.2	Combustible gas detection	Function check and verification, or check of log book
25.3	CO2 alarms	Function check and verification
25.4	Fan and oil pump automatic shutdown before CO2 release	Function check and verification
26	**Fire Fighting**	
26.1	Water fire-fighting system	Function check and verification
26.2	Fixed foam fire-extinguishing system	Check latest record
26.3	Fixed CO2 fire-extinguishing system	Check latest record
26.4	Fire pumps and emergency fire pump	Function check and verification, check pressure
26.5	Remote start and stop of fire pumps	Function check and verification
26.6	Water spray of cargo area	Function check and verification
26.7	Fire main	Check supporting, leaks and vibration measurement
26.8	Water, foam, powder extinguishers	Check last test date
26.9	Fire stations	Check all allocation for equipment
26.10	Fire pump wear	Vibration measurement
27	**Maintenance Support Functions**	
27.1	Lifting and service appliances of engine room	Function check and verification, or check of test report
27.2	Lifting appliance overload switch of engine room	Check alarm or check of log book
27.3	Hatch covers of engine room and store room	Function check and verification
27.4	Other overhaul tools	Check storage and function
28	**Maintenance Standard and Parts Condition**	
28.1	PMS program	Check extent of PMS programme
28.2	Plan and interval of equipment maintenance	Check PMS programme
28.3	Equipment maintenance work card	Check PMS programme
28.4	Records for equipment repair/maintenance	Check work description
28.5	PMS implementation and management system	Function check and verification
28.6	Quality of performed works	Check equipment operation record
28.7	Overdue running equipment	Check for overdue items

No.	Survey items	Survey requirements/data collection
28.8	General cargo area condition	Visual inspection, e.g. check for cleanliness, oily water and safety means for crew, etc.
28.9	General engine room condition	Visual inspection, e.g. check for cleanliness, oily water and safety means for crew, etc.
28.10	Inventory system	Check inventory list
28.11	Spare parts	Verify number and quality of spare parts
28.12	Spare parts storage	Check for storage spaces
29	**Anchoring and Mooring Equipment**	
29.1	Windlasses and foundations	Function check and verification, visual inspection for corrosion of foundation and bolt fastening
29.2	Chain stoppers	Visual inspection, function check and verification
29.3	Mooring winches and foundations	Function check and verification, visual inspection for corrosion of foundation and bolt fastening
29.4	Mooring lines	Visual inspection
29.5	Bollards and fairleads	Visual inspection
29.6	Hydraulic system	Visual inspection, function check and verification
29.7	Hydraulic oil	Oil sample
29.8	Emergency towing arrangements	Function check and verification, visual inspection for corrosion of foundation, bolt fastening and appearance
29.9	Windlass and winch brakes	Visual inspection of brake, brake test and check lub.oil condition of bearings of the windlass and observe the anchor hoisting speed of the windlass
29.10	Windlass and winch clutches	Function check and verification
30	**Lifting Appliances**	
30.1	General condition	Visual inspection
30.2	Fittings	Visual inspection
30.3	Loose gears	Visual inspection of block, shackle and crane hook, etc.
30.4	Steel wires	Visual inspection
30.5	Hydraulic system	Visual inspection, function check and verification
30.6	Hydraulic oil	Oil sample
30.7	Limit switches	Function check and verification
30.8	Lifting test	Function check and verification/ survey certificates of lifting appliances
31	**Hatch Cover Operating System**	
31.1	Securing devices	Visual inspection for corrosion and deformation, function check and flexibility verification
31.2	Stoppers	Visual inspection for corrosion and deformation, check alignment with the stiffener below, check the stiffener for welding, corrosion and deformation
31.3	Guide devices	Visual inspection for corrosion and deformation, function check and flexibility verification
31.4	Operating devices and hatch cover operating test	Function check and verification
31.5	Hydraulic system	Visual inspection, function check and verification
31.6	Hydraulic oil	Oil sample

No.	Survey items	Survey requirements/data collection
32	**Survival Craft and Launching Arrangements**	
32.1	Lifeboats	Visual inspection
32.2	Liferafts	Visual inspection
32.3	Launching arrangements and foundations	Function check and verification, visual inspection for corrosion of foundation and bolt fastening
32.4	Hydraulic system	Visual inspection, function check and verification
32.5	Hydraulic oil	Oil sample analysis report

Note: (1) Items may not be limited to the above-mentioned.

Appendix 7 Checklist of Engine Data

Engine data

Vessel Name: IMO No.: Date:

Main Engine

Engine type/Series No.				Main engine power				Total running hours										
Loading condition				Turbocharger (s)												1	2	
Engine speed (rpm)				Turbocharger speed (rpm)														
Ship speed				Pressure (MPa)	Filter pressure drop													
Fuel consumption					Air cooler pressure drop													
Load indicator					Scavenging manifold													
Pressure (MPa)	FO	Before filter		Temperature (℃)	Scav air	Cooler inlet												
		After filter				Cooler outlet												
	LO	Piston				Scavenging manifold												
		Bearing			Exhaust	Turbine inlet												
		Turbo				Turbine outlet												
	FW (HT) cooling				SW(LT)	Air cooler inlet												
	SW (LT) cooling					Air cooler outlet												
Temp. (℃)	SW (ambient)			Coolers														
	Engine room (T/C inlet)			Temperature (℃)	FW(HT) cooling	FW(HT) inlet/outlet												
	Stern tube bearing					FW(LT) inlet/outlet												
	Thrust bearing				LO cooling	LO inlet/outlet												
FO	Engine inlet temp					SW (LT) inlet/outlet												
	Temp/viscosity set point			Purifier												LO	FO	
	Calorific value			Purifier inlet temperature														

Cylinder		1	2	3	4	5	6	7	8	9	10	11	12	Mean	Max.dev.
Indicated power (kW)															
Fuel pump index															
F.p.i.(bef.Start)															
Pressure (MPa)	Max pressure														
	Compression														
	MIP														
Temp. (℃)	Exhaust gas														
	Fuel valve cooling														
	FW(HT)														
	Piston cooling														

Remarks:

Generating set prime mover No.1															
Type/Series No.							Scavenging air pressure (MPa)								
Cylinder		1	2	3	4	5	6	7	8	9	10	11	12	Mean	Max.dev.
Indicated power (kW)															
Fuel pump index															
F.p.i. (bef.start)															
Pressure (MPa)	Max pressure														
	Compression														
	MIP														
Temp. (℃)	Exhaust gas														
	FW(HT)														

Generating set prime mover No.2															
Type/series No.							Scavenging air pressure（MPa								
Cylinder		1	2	3	4	5	6	7	8	9	10	11	12	Mean	Max.dev
Indicated power (kW)															
Fuel pump index															
F.p.i. (bef.start)															
Pressure (MPa)	Max pressure														
	Compression pressure														
	MIP														
Temp. (℃)	Exhaust gas														
	FW(HT)outlet														

Generating set prime mover No.3															
Type/series No.							Scavenging air pressure (MPa)								
Cylinder		1	2	3	4	5	6	7	8	9	10	11	12	Mean	Max.dev
Indicated power (kW)															
Fuel pump index															
F.p.i. (bef.start)															
Pressure (MPa)	Max pressure														
	Compression														
	MIP														
Temp. (℃)	Exhaust gas														
	FW(HT)														

Generating set prime mover (Turbine-driven generating set)										
Type/series No.	Load (kWe)	Revolutions (rpm)	Pressure (MPa)					Temperature (℃)		
			Steam inlet	Steam inlet	Main exhaust line	LO before filter	LO after filter	Steam inlet	LO before filter	LO after filter
Mooring test record										
Sea trial record										
Remarks:										

Appendix 8 BP CAP Requirements[①]

1. BPS requires only the CAP Hull Structure survey report with fatigue analysis. Other supporting Class documents may also be requested as part of the assessment process. CAP Machinery and Cargo systems is not required.

2. CAP Hull structure is still required for Oil and Chemical tankers and LPG vessels >20,000 dwt complete with simplified fatigue analysis after reaching 15 years of age or at 3rd special survey, whichever is earliest.

Similarly, CAP Hull structure is required for LNG vessels complete with simplified fatigue analysis and additional critical area inspections after reaching 20 years of age or at 4th special survey, whichever is earliest.

Barges >15 years and >20,000 dwt will also require CAP with a simplified fatigue analysis.

3. Only CAP ratings of '1' or '2' are acceptable to BPS, and a maximum validity period that can be assigned on completion of a satisfactory review on the CAP report and associated data is 3 years.

4. Only CAP surveys carried out by ABS, BV, ISC, DNV-GL, KRS, LR, NKK and RINA will be accepted.

5. In recognition that a CAP report may not always be available on completion of CAP hull surveys, consideration can be given for a 3 month period of grace for supply of the CAP report. This is on the basis of provision of a statement for achieving a minimum rating '2' complete with supporting reports on current status, extent of repairs carried out and supplementary CAP and Class report data.

6. In consideration to achieving an acceptable rating, ('1 'or '2 '), the following should be noted for Owners guidance:

• There must be no areas of 'poor' coatings (Iocalised or otherwise) on completion of the CAP survey.

• There must be no areas of substantial corrosion present on completion of the CAP survey.

• AII WBT coatings must be 'good' for a rating '1' for first CAP at 15 years for all structures within a space/area.

• For a CAP rating '1' at 15 years, the UTM’s and overall rating for upper deck structures and associated deck longitudinals must not be < rating '1 '.

• Any changes to the current Class permissible diminution limits for plating and stiffeners is to be highlighted within the CAP report and supporting data provided for consideration.

• Doubler repairs effected to corroded structures will not be accepted other than those currently used around manholes/lightening holes on the basis of utilising correct surface preparation and weld procedures.

• Repairs effected to corroded structures by means of additional structural stiffening and resultant reassessed scantlings will not be acceptable.

• In general, repairs are to be undertaken to reinstate the vessel structure in accordance with the Class approved as built arrangements.

•The vessels assigned bending moments are to be verified in the CAP report as same determined at time of vessel delivery.

• The final CAP report must clearly state the attendance period of the CAP surveys including the start date of the hull surveys and the last day of attendance, the last day being the date from which BP Shipping will assign a validity period as appropriate. The location(s) of the surveys should be clearly stated.

① This appendix is for reference and is subject to official publication

• The CAP surveys should be completed within a continuous six month time frame inclusive of the dry docking.

• The CAP survey report must contain full details of the nature and dimensions of defects found during the course of the survey, and type and extent of subsequent repairs effected.

• In support of the above, clear photographs demonstrating the before and after general condition of the vessel including representative defects are to be provided with title of location and identification of structure in view.

• Recurring critical fractures/cracks found as a result of the fatigue analysis or identified through the vessel's historical technical reports (see below) may lead to the vessels rejection if the original structural arrangement is not subject to modification. The root cause of all reported cracks and fractures should be stated within the CAP report.

• An examination of the vessels structural history is to be provided recording deficiencies reported as a result of fractures/cracks, corrosion (including pitting) and deformation. Any modifications undertaken are also to be reported on and history of coating condition of the WBT' s. A minimum of the last 10 years of records are to be reviewed and reported on.

• A copy of the current Class status report to be provided on submission of the CAP report.

• The thickness measurement analysis is to be based upon the original approved design/constructed scantlings. Supporting data for any subsequent reassessment as a result of difference in Rules or Owners original increases are to be detailed within the CAP report.

• Validity of thickness measurement reports to be less than one year prior to commencement of CAP surveys.

• Reporting of coatings is to be in accordance with the latest IACS requirements, and associated rating scheme to directly relate to the 'Good' (Rating'1'), 'Fair' (Rating'2'), 'Poor' (Rating '3') definitions. Where coating breakdown occurs which affects a rating, details should be provided of location and condition .

The above has a few minor amendments to the letter issued on 2007, and we would be grateful if it is implemented at the earliest opportunity, but no later than end of March 2017 for all new CAP contracts.

Failure to include the above requirements may require the CAP report to be to be returned for review and amendment by the CAP provider.

In support of these latest CAP requirements, we would also like to reaffirm BP Shipping policy requirements as regards vessel age and double hull requirements, which are:

Vessels ≥5,000 DWT carrying Oil or Chemical cargo in bulk	max 20 years
Vessels < 5,000 DWT carrying Oil or Chemical cargo in bulk	max 25 years
Vessels carrying LPG in bulk	max 25 years
Vessels carrying LNG in bulk	max 40 years
Combination Carriers	max 15 years
Bulk carriers ≥140,000DWT, excl. those on Inland Waterways	max 15 years
Bulk carriers ≥5,000DWT but <140,000 DWT, excl. those on Inland Waterways	max 25 years
Bulk carriers < 5,000 DWT, excl. those on Inland Waterways	no age limit
Bulk carriers on Inland Waterways	no age limit
Offshore Support Vessels	no age limit
Inland Waterway vessels (inland voyages)	no age limit

And,

Vessels≥600 DWT carrying Oil or Chemical cargo in bulk	Double Hull
Inland Water vessels≥600 DWT carrying Liquid Bulk Cargo This requirement does not apply to ICE, PLATTS or FOB sales of non-persistent Liquid Bulk Cargo in the Flushing, Antwerp, Rotterdam, Amsterdam, Ghent region only	Double Hull
Offshore Support Vessels used for, or in support of, exploration or production activities	Not required
Vessels < 600 DWT carrying Liquid Bulk Cargo	Not required
Storage Vessels (FPSO, FSO, TSV)	Depends on use