

RUSSIAN MARITIME REGISTER OF SHIPPING



APPROVED

Director General
Sergei Kulikov
12.09.2023

Recommendations on the Condition Assessment Program (CAP) ND No. 2-039901-006-E

Implemented since: 12.09.2023
System "Thesis" No. – 23-176643
Developed by: 322

**St Petersburg
2023**

Annotation

The Recommendations on the Condition Assessment Program (CAP) (hereinafter referred to as "the Recommendations") have been developed on the basis of the Register's experience in the CAP implementation, considering the requirements of oil companies which are direct consumers of the Register CAP services. The procedure, performance criteria and scope of CAP have been established.

Compared to the previous version of the Recommendations (app. on 07.07.2023), the following changes have been implemented to this version:

- 1) Section 2 was added with reference to ND No. 2-060203-027-E.
- 2) Chapter 4.1 "General Provisions" was supplemented with paragraphs 4.1.1.1.- 4.1.1.3 on CAP requests and paragraph 4.6.1 about CAP results.
- 3) Paragraph 4.3.1 was supplemented with a more detailed description of the main stages of work.
- 4) Paragraph 4.5.1.1 was supplemented with requirement for the minimum number of cross sections to be measured.
- 5) Chapter 4.6 was supplemented with paragraph 4.6.4 with recommendations on issuing a report on the results of hull strength calculations for compliance with CAP criteria.
- 6) In paragraph 4.6.2, the requirements for the checking the overall strength and strength of the ship's hull elements have been adjusted.
- 7) Paragraph 4.7.3 was supplemented with recommendations on issuing a CAP report.
- 8) Table 4.8.1 was supplemented with a reference to Annex 4.
- 9) The numbering of Annexes was changed: A to 1, B to 2, C to 3.
- 10) Added Annex 4. Structure of attachments with photographic materials based on the results of the survey of the ship for the CAP Report.

1 Application

- 1.1 The Recommendations establish the procedure, performance criteria and scope of CAP.
- 1.2 The Recommendations are a normative document for RHO Locations 210, 320 and RS Branch Offices.
- 1.3 The Recommendations have been developed in Russian and English, the original document is maintained in electronic format.

2 Normative references

- 2.1 Requirements of the following normative documents have been taken into account when developing the Recommendations:
 - 1) ND № [2-060101-001](#) – Quality Manual;
 - 2) ND № [2-060203-019](#) – Procedure for Development of RS Internal Normative Documents;
 - 3) ND № [2-060203-028](#) – Procedure for Control of Quality Records;
 - 4) ND № [2-020101-174](#) – Rules for the Classification and Construction of Sea-Going Ships;
 - 5) ND № [2-020101-012](#) – Rules for the Classification Surveys of Ships in Service;
 - 6) ND № [2-030101-009](#) – Guidelines on Technical Supervision of Ships in Service with Annexes;
 - 7) ND № [2-170101-001](#) – Occupational Safety Instructions for RS Surveyors Conducting Survey of Ships and Items of RS Technical Supervision.
 - 8) [ND No. 2-060203-027-E – Procedure for Reviewing Requests for RS Services.](#)

3 Terms. Definitions. Abbreviations

3.1 Abbreviations

- 1) CAP – Condition Assessment Program.
- 2) ACS – another classification society.
- 3) RHO – RS Head Office.
- 4) RS, Register – Russian Maritime Register of Shipping.

- 5) Division 210 – Ships in Service Division.
- 6) Division 320 – R&D and Engineering Division.
- 7) Recommendations – Recommendations on the Condition Assessment Program (CAP).
- 8) CAP Certificate – Certificate of Condition Assessment Program (CAP) (form 3.1.12).

4 General

4.1 General provisions

4.1.1 CAP is a supplement to classification procedure of the Register intended for assessment and analysis of actual condition of ship's hull structures, mechanical installation, machinery, devices, systems and electrical equipment. CAP is a tool for quality assessment of the ship and ship's elements, irrespective of age in accordance with the established rating system.

CAP may be carried out for the following groups of items:

- ship's hull ("HULL" group);
- mechanical installation, machinery, arrangements, systems, including cargo system and electrical equipment of the ship ("MACHINERY, SYSTEMS" group).

The items included in each group of items are given in 4.5.6 and 4.5.7.

CAP is carried out by the Register at the Request of a shipowner on a reimbursement basis for oil tankers, chemical tankers, gas carriers and oil bulk carriers. CAP may be applied for the RS class ships in service as well as for transfer of the ship to RS class and for ACS class ships, except ACS – IACS members.

4.1.1.1 The general provisions for handling applications are set out in ND No. 2-060203-027-E – Procedure for Reviewing Requests for RS Services. To process an application, as a rule, the forms of the RS contractual documentation for the ship's survey are used (in particular, 430.1.1).

Request for CAP service shall contain:

1) The name of the object group for CAP survey (see 4.1.1);

2) Ship data.

4.1.1.2 In the process of fulfilling the CAP service request for objects of the "HULL" group, it is required to consider/perform the strength calculation specified in 4.6 and 4.8.2, which is performed on a separate supplication of the shipowner, in accordance with the RS contractual documentation forms (430.1.11 or 430.1.13).

4.1.1.3 In case of receipt of a request for a CAP, the RS subdivision should inform the Head Office in accordance with 4.8.

4.1.2 CAP results are used by insurance companies, cargo terminals, charterers and shipowners.

4.1.3 The objective of CAP is to determine actual condition of items listed in 4.1.1 and to assign the rating to the groups of ship's items in compliance with the applicable requirements of the Rules for the Classification and Construction of Sea-Going Ships and Rules for the Classification Surveys of Ships in Service.

4.1.4 The unified CAP rating scale described in 4.2 is used.

4.1.5 Within the CAP the Register does not assess ship's characteristics having direct effect on the commercial results of ship's operation, such as speed, fuel rate of main engine, auxiliary machinery, etc.

4.1.6 Based on the CAP results, a CAP Certificate (form 3.1.12) or a Letter of Conclusion is issued, as indicated in 4.3.

4.2 Condition rating scale

4.2.1 The Register assesses the actual condition of ship hull using the unified **CAP1** to **CAP4** rating scale (rating system).

CAP1 is the maximum rating corresponding to "very good" actual condition of ship (or ship's components and elements).

CAP2 corresponds to "good" actual condition of ship (or ship's components and elements).

CAP3 corresponds to "satisfactory" actual condition of ship (or ship's components and elements).

CAP4 corresponds to "poor" actual condition of ship (or ship's components and elements).

4.2.2 CAP rating system for the "**HULL**" group is based on the assumption that the components selected for assessment are sufficient for evaluation of the ship's hull as a whole. The CAP rating is assigned according to the following criteria:

- overall condition of the structure (refer to Table 4.2.2-1), condition of the protective coating (refer to Table 4.2.2-2), overall technical condition of the anchoring arrangement (refer to Table 4.2.2-3), condition of cathodic protection (refer to Table 4.2.2-4) with respective CAP rating (refer to Table 4.2.2-5);
- technical condition based on the results of assessment of the ship's hull strength with respective CAP rating (refer to Table 4.2.2-6);
- technical condition based on the results of assessment of the hull structure actual wear with respective CAP rating (refer to Table 4.2.2-7);
- technical condition based on the results of assessment of the structure residual service life with respective CAP rating (refer to Table 4.2.2-8).

The total CAP rating for the "**HULL**" group is assigned as an average value of assessment by 4 criteria according to Tables 4.2.2-5 to 4.2.2-8. The total rating shall not exceed the rating given in Table 4.2.2-5. In case **CAP3** or **CAP4** rating is assigned by at least one of the criteria according to Tables 4.2.2-5 to 4.2.2-8, the total rating shall not exceed **CAP3** or **CAP4** respectively.

Table 4.2.2-1

Verbal description	Criteria for assessment of overall condition of hull structures, superstructures, deckhouses, closures of openings in outer envelope of the ship based on results of visual examination
Good	Structures, their welded joints are not damaged or have sporadic defects. A small amount of defects such as smooth bulging, corrugation of plating and flooring, which are within the tolerances specified in the RS rules is allowed. Tightness and structural integrity of the examined items are intact.
Satisfactory	Structures, their welded joints have visible defects, which do not significantly affect the bearing capacity of the structure: residual deformations, pitting corrosion, which are within the tolerances specified in the RS rules. Tightness and structural integrity of the examined items are intact.
Unsatisfactory	Structures, their welded joints have defects, which slightly exceed or equal to the tolerances specified in the RS rules. Tightness and structural integrity of the examined items are intact. Repair is required.
Poor	Structures, their welded joints have defects, which considerably exceed the tolerances specified in the RS rules. Tightness and structural integrity of the examined items are damaged. Complete and urgent repair is required to restore serviceability.

Table 4.2.2-2

Verbal description	Criteria for assessment of protective coating condition
Good	Coating condition with spot corrosion on the area of less than 3 % of the area under consideration without visible coating damage. Corrosion at edges of stiffeners or welded joints is less than 20 % of the areas under consideration.
Fair	Condition with coating damage or corrosion propagation on the area of less than 20 % of the area under consideration. The area of the solid corrosion layer propagation is less than 10 % of the area under consideration. Corrosion at edges of stiffeners or welded joints is less than 50 % of the areas under consideration.
Poor	Condition with coating damage or corrosion propagation area more than 20 % or with solid corrosion layer more than 10 % of the area under consideration or local failure concentrated at edges of stiffeners or welded joints more than 50 % of the areas under consideration.
Note. The guidelines on assessment of protective coating condition is given in Annex 52 "Guidelines on Survey and Assessment of Coating Condition of Ship's Spaces" to the Guidelines on Technical Supervision of Ships in Service.	

Table 4.2.2-3

Verbal description	Criteria for assessment of the anchoring arrangement condition
Good	Actual wear of anchor chain components is within the tolerance and equal to not more than 50 % of limit values.
Satisfactory	Actual wear of anchor chain components is within the tolerance and equal to more than 50 % of limit values.
Poor	Actual wear of anchor chain components exceeds the allowable limit values.
Note The guidelines on assessment of anchoring equipment condition are given in Annex 50 "Guidance on Technical Supervision of Anchoring Equipment in Service (with due Account for the Provisions of IACS Recommendation No. 79) to the Guidelines on Technical Supervision of Ships in Service.	

Table 4.2.2-4

Verbal description	Criteria for assessment of cathodic protection condition
Superior	Anode consumption is from 0 to 25 %.
Good	Anode consumption is from 25 to 50 %.
Satisfactory	Anode consumption is from 50 to 65 %.
Poor	Anode consumption is from 75 to 100 %.

Table 4.2.2-5

CAP rating	Criteria for assigning CAP rating based on the results of technical condition and coating condition assessment
CAP1	Overall condition of the structure is assessed as "good". Condition of coating, where applicable, is assessed as "good".
CAP2	Overall condition of the structure is assessed as "satisfactory". Condition of coating, where applicable, is assessed as "satisfactory" or "good".
CAP3	Overall condition of the structure is assessed as "unsatisfactory". Condition of coating, where applicable, is assessed as "poor" or "satisfactory".
CAP4	Overall condition of the structure is assessed as "poor". Condition of coating, where applicable, is assessed as "poor".

Table 4.2.2-6

CAP rating	Criteria for assigning CAP rating based on the results of strength assessment
CAP1	Actual hull strength is not less than 98 % of the values required for a new ship.
CAP2	Actual hull strength is not less than 95 % of the values required for a new ship.
CAP3	Actual hull strength is not less than 90 % of the values required for a new ship.
CAP4	Actual hull strength is less than the values required to retain the ship's class.

Table 4.2.2-7

CAP rating	Criteria for assigning CAP rating based on the results of the hull structure actual wear assessment
CAP1	Minor wear (not more than 35 % of limit values) of hull members is allowed.
CAP2	Actual wear of hull members is within the tolerance and equal to not more than 75 % of limit values.
CAP3	Actual wear of hull members is within the tolerance but exceeds 75 % of limit values.
CAP4	Actual wear of separate hull members exceeds limit values to retain the ship's class.

Table 4.2.2-8

CAP rating	Criteria for assigning CAP rating based on the results of the structural residual service life assessment
CAP1	Structural residual service life is not less than 25 years.
CAP2	Structural residual service life is not less than 15 years.
CAP3	Structural residual service life is not less than 7 years.
CAP4	Structural residual service life is less than 7 years.

4.2.3 Four-grade rating scale by four criteria is used as a rating system for the "**MACHINERY, SYSTEMS**" group (refer to Table 4.2.3-1):

- assessment of overall technical condition based on results of visual examination (refer to Table 4.2.3-2);
- assessment of overall technical condition based on results of functional and operational tests (refer to Table 4.2.3-3);
- assessment of overall technical condition based on results of diagnostic parameter assessment (refer to Table 4.2.3-4);
- assessment of maintenance and availability of spare parts (refer to Table 4.2.3-5).

Table 4.2.3-1

CAP rating	Criteria for assigning CAP rating for " MACHINERY, SYSTEMS " group
CAP1	Overall technical condition based on results of visual examination is assessed as "good" or "satisfactory". Overall technical condition based on results of functional and operational tests is assessed as "good". Overall technical condition based on results of diagnostic parameter assessment is assessed as "good". Maintenance and availability of spare parts are assessed as "good".
CAP2	Overall technical condition based on results of visual examination is assessed as "good" or "satisfactory". Overall technical condition based on results of functional and operational tests is assessed as "satisfactory". Overall technical condition based on results of diagnostic parameter assessment is assessed as "good". Maintenance and availability of spare parts are assessed as "good" or "satisfactory".
CAP3	Overall technical condition based on results of visual examination is assessed as "unsatisfactory". Overall technical condition based on results of functional and operational tests is assessed as "unsatisfactory". Overall technical condition based on results of diagnostic parameter assessment is assessed as "good". Maintenance and availability of spare parts are assessed as "satisfactory".
CAP4	Overall technical condition based on results of visual examination is assessed as "poor". Overall technical condition based on results of functional and operational tests is assessed as "poor". Overall technical condition based on results of diagnostic parameter assessment is assessed as "poor". Maintenance and availability of spare parts are assessed as "poor".

Table 4.2.3-2

Verbal description	Criteria for assessment of overall technical condition based on results of visual examination
Good	No visible defects are detected. Condition of coating is "good". No leakage traces are detected.
Satisfactory	Minor damages, which do not affect safe operation, are detected. No leakage traces are detected.
Unsatisfactory	Damages, which are within limit values to retain the ship's class and which do not affect safe operation but require maintenance and repair, are detected. No leakage traces are detected.
Poor	Damages, which may affect safe operation are detected. Leakage traces are detected.
N/A (Not applicable)	Type of the system under consideration or its component due to structural features or functionality does not allow to assign a respective verbal description.

Table 4.2.3-3

Verbal description	Criteria for assessment of overall technical condition based on results of functional and operational tests
Good	Items and systems are surveyed, functionally and operationally tested. Performance corresponds to the manufacturer's requirements and requirements to retain the ship's class. Equipment control and safety devices are completely serviceable.
Satisfactory	Items and systems are surveyed, functionally and operationally tested. Minor faults and deviations from the required performance which do not affect safe operation of the equipment and do not require maintenance or repair are detected. Equipment control and safety devices are completely serviceable.
Unsatisfactory	Items and systems are surveyed, functionally and operationally tested. Performance insignificantly exceeds or are within the limits specified in the RS rules. Faults, which do not affect safe operation of the equipment but require maintenance and repair, are detected. Equipment control and safety devices are completely serviceable.
Poor	Faults, which may affect safe operation of the equipment, are detected. Performance is considerably lower than the required values to retain the ship's class. Faults in the equipment control and safety devices are detected. Immediate actions are required to restore serviceability.
N/A (Not applicable)	Type of the system under consideration or its component due to structural features or functionality does not allow to assign a respective verbal description.

Table 4.2.3-4

Verbal description	Criteria for assessment of overall technical condition based on results of diagnostic parameter assessment (vibration, oil analysis, bearing clearances, etc.)
Good	Diagnostic parameters of equipment are within the tolerance. Oil sample results are within the tolerance. Elevated equipment vibration is not detected.

Poor	Diagnostic parameters do not correspond to the tolerance. Oil sample results exceed the tolerance. Elevated equipment vibration is detected.
N/A (Not applicable)	Type of the system under consideration or its component due to structural features or functionality does not allow to assign a respective verbal description.

Table 4.2.3-5

Verbal description	Criteria for assessment of maintenance and availability of spare parts
Good	Regular maintenance of equipment, availability of schedules and application of diagnostic equipment are documented. Quantity and nomenclature of spare parts correspond to the recommendations of the manufacturer and the RS normative documents. The information on storage location of spare parts, records on availability, consumption and order system of spare parts is available.
Satisfactory	The minimum scope of maintenance performed according to the recommendations of the manufacturer and the RS normative documents is documented. Deviations from the recommended quantity and nomenclature of spare parts are detected. The information on storage location of spare parts, records on availability, consumption and order system of spare parts is available. Minor deficiencies, which do not affect safe operation of the equipment, are allowed.
Poor	Significant faults in maintenance of the equipment which may affect safe operation of the equipment are detected. The information on storage location of spare parts, records on availability, consumption and order system of spare parts is not available.
N/A (Not applicable)	Type of the system under consideration or its component due to structural features or functionality does not allow to assign a respective verbal description.

4.2.4 In case the elements having condition below the minimum requirements specified in the RS rules for the RS-classed ships are detected, the Register reserves the right to require elimination of detected defects (refer to Annex 17 to the Guidelines on Technical Supervision of Ships in Service). For ACS-classed ships subject to CAP, the Register shall notify the shipowner in writing on detected elements having condition below the minimum requirements and necessity to inform the corresponding classification society about this matter.

4.3 CAP operations execution

4.3.1 CAP procedure of the Register includes the following main stages:

- sending a CAP request to the Head Office, in a case of a shipowner's application to the RS subdivision, in accordance with 4.8;
- analysis of the Shipowner's Request (in particular, it is necessary to determine whether the ship is subject to the Register CAP procedure, in accordance with 4.1.1; whether the ship is required to calculate the fatigue strength and determine the remaining service life, in accordance with 4.6.3);
- review of documents;
- preparation to survey and performance of survey;
- issue of checklists according to forms 6.3.67 and 6.3.68 (if applicable), in accordance with the list of electronic forms of RS documents and photo reports based on survey results, in accordance with 4.8.1 and Annex 4;
- hull strength analysis for compliance with the CAP criteria/consideration/performance of the hull strength calculations for compliance with CAP criteria (for assigning a rating score for the "HULL" group), in accordance with 4.6;
- issue of a RS reporting document, in case of the hull strength calculated for compliance with the CAP criteria (for assigning a rating score for the "HULL" group), in accordance with 4.6.4;
- sending a Letter of Conclusion to the shipowner on the consideration/performance of hull strength calculations for compliance with the CAP criteria (for assigning a rating score for the "HULL" group);
- preparation and issue of the Condition Assessment Program Report, in accordance with 4.7;
- preparation and issue of the CAP Certificate as per form 3.1.12 (for **CAP1** and **CAP2**) or a Letter of Conclusion (for **CAP3** and **CAP4**).

Additional information on the organization of the Register's work on the implementation of the CAP is given in 4.8.

4.4 Review of documents

4.4.1 The list of information submitted ~~to by~~ the shipowner is given in ~~Annex A~~ Annex 1.

4.4.2 According to the Request of the shipowner during preparation to CAP execution, the Register reviews the following documents included in the Ship's File and/or received from the shipowner:

- Classification Certificate and others, if any;
- current surveys status;
- RS reports, checklists (or, if applicable, ACS – IACS member), at least the last special and subsequent surveys of the ship (to specify the status and presence of any recurring failures, as well as repair and survey history);
- reports on hull condition, reports on thickness measurements, repair reports, history of ship's hull damages, transported cargoes, areas of ship operation and other documents on actual condition of ship's hull for the operation period preceding the CAP procedure execution;
- planned maintenance system (PMS) documentation, if any, for machinery and cargo system (maintenance schedules; documents confirming fulfilment of the PMS operations and schedules); documents demonstrating technical condition before and after maintenance; records on accidents, failures and emergencies, replacement and repair of the CAP items;
- records on technical condition and/or worksheets for checking technical condition of machinery, or special forms of records on the results of technical condition monitoring during the maintenance. The documents submitted shall contain the results of surveys and measurements carried out during the maintenance, as well as the limit values of technical condition parameters (sizes, clearances, condition of surfaces, etc.) determined by the manufacturer or other recognized organization. Causes of failures, accidents, replacements and repairs shall be specified.

4.4.3 Upon request of the Register Head Office (RHO), the shipowner and/or the RS Branch Office for in-service supervision shall provide additional information and ship documents required for the CAP execution.

4.4.4 During review the special attention shall be given to hull defects appeared within the first 10 years of ship's operation, recurring defects and information on accidents. Causes of defects shall be identified and eliminated.

4.4.5 Based on the reviewed documentation, the Register shall make a decision on possibility to execute the CAP procedure for a ship, preliminary conclusions on the surveys carried out, requirements to be met, ship's condition, operating conditions of the shipboard machinery, etc., determine the items subject to closer attention, specify the scope of surveys, measurements, tests and checks.

4.4.6 If during review of the documents some doubts on possibility of issue of the CAP Certificate appear, RHO may offer to perform preliminary assessment, including strength analysis based on the existing fault detection reports, repair lists and reports on survey. Upon review of the preliminary assessment results, the shipowner shall make a decision on expediency of the CAP execution and inform the Register.

4.5 Survey within the CAP framework

4.5.1 The scope of survey within the CAP framework is determined in each particular case depending on the groups of items (refer to 4.1.1), subject to assessment and specified by the shipowner in the Request as well as the requirements of the Rules for the Classification Surveys of Ships in Service with reference to age and class of the ship as well as type of survey and shall include, at least, the following:

.1 for Request for assessment of "**HULL**" group items:

- annual survey of the hull, survey of anchoring arrangement and steering gear, rudder blade, propellers and active means of ship's steering in the scope of annual survey for the ships up to 5 years of age. For the RS-classed ships without class or from society - non-IACS member, it is required to perform random thickness measurements of the elements of the hull, superstructure, deckhouses and closures of openings in outer envelope of the ship, as deemed necessary by the RS surveyor;
- for the ships 5 years of age and above, special survey of the hull, anchoring arrangement and steering gear, rudder blade, propellers and active means of ship's steering in the scope of annual survey.

When aligning the CAP surveys with special or intermediate survey, the scope of the CAP survey shall correspond to special or intermediate hull survey respectively;

The minimum number of measured cross sections shall comply with 2.4.2.6.2 of Part II "Survey Frequency and Scope" of ND No. 2-020101-012.

.2 for Request for assessment of the "**MACHINERY, SYSTEMS**" group items:

– annual survey of machinery, systems, including cargo system, arrangements and electrical equipment of the ship. When aligning the CAP surveys with special or intermediate survey, the scope of the CAP survey shall correspond to the scope of special or intermediate survey respectively.

4.5.2 When assigning the scope of the CAP survey for the "**HULL**" group, the following may be partially considered:

– results of the previous special/intermediate classification survey performed by RS or ACS – IACS member not earlier than 12 months before the shipowner's application;

– results of thickness measurements carried out under technical supervision of RS or ACS – IACS member not earlier than 12 months before the shipowner's application. In case the results of measurements carried out under technical supervision of ACS – IACS member are taken into consideration, check measurements of thickness under the RS surveyor supervision shall be carried out.

4.5.3 The possibility of aligning the CAP survey with periodical classification surveys shall be decided by the Register in each particular case on the basis of the shipowner's Request and review of documents.

4.5.4 When aligning the CAP surveys with periodical classification survey, the CAP report documents shall be prepared separately. Defects detected during the CAP survey shall be documented in the RS records in a proper manner.

4.5.5 The CAP survey results to be included in the CAP Report may be obtained from several surveys within a period not more than 6 months.

4.5.6 The CAP survey results for the "**HULL**" group shall be prepared by the RS surveyor carrying out a survey in the form of a Checklist on ship's CAP **HULL** survey. A respective checklist shall be prepared by the RS surveyor(s) based on the survey results for each item/space including, at least, the following:

- bottom shell plating along the ship's length;
- portside and starboard shell plating along the ship's length;
- deck and platform plating;
- sacrificial anode protection of shell plating, if any;
- thruster, if any;
- anchoring arrangement;
- steering gear and rudder blade;
- propeller or active means of ship's steering (as applicable);
- superstructure/deckhouse walls;
- each cargo hold/tank on board the ship;
- each ballast tank on board the ship;
- each void space;
- closures of openings in outer envelope.

Photos of each surveyed space/item proving technical condition of the item at the moment of survey shall be attached to the records. Photos made by the RS surveyor shall be clearly indicated (refer to 3.4.1 Part I "General" of the [Guidelines on Technical Supervision of Ships in Service](#)). This information shall correspond to the information on the item shown in the photo. Generally, 4 to 8 photos shall be made for each surveyed item/space.

Where applicable, reports and results of survey tests and measurements shall be attached to the filled-in forms of the documents.

4.5.7 The CAP survey results for the "**MACHINERY, SYSTEMS**" group are prepared by the RS surveyor carrying out a survey in the form of a Checklist on Ship's CAP **MACHINERY, SYSTEMS** survey. A respective checklist shall be prepared by the RS surveyor(s) based on the survey results for each item/system component including, at least, the following:

- each main engine (with auxiliary machinery, arrangements and systems as well as engine room as a whole);
- each auxiliary engine (with auxiliary machinery and arrangements);
- each main and emergency power source (with auxiliary machinery and switchgear assemblies);
- all liquid cargo system components of oil tankers (including associated pumps, pipelines, valves, instrumentation, machinery and arrangements, safety systems as well as associated spaces on the ship as a whole);

- all ballast system components (including associated pumps, pipelines, valves, instrumentation, machinery and arrangements);
- anchoring arrangement, steering gear, thrusters and mooring gear (with auxiliary machinery and arrangements);
- propeller, intermediate and thrust shafts (as applicable).

Photos of each surveyed space/item proving technical condition of the item at the moment of survey shall be attached to the records. Photos made by the RS surveyor shall be clearly indicated (refer to 3.4.1 Part I "General" of the [Guidelines on Technical Supervision of Ships in Service](#)). This information shall correspond to the information on the item shown in the photo. Generally, 4 to 8 photos shall be made for each surveyed item/space.

Where applicable, reports and results of survey tests and measurements shall be attached to the filled-in forms of the documents.

4.6 Hull strength analysis for compliance with CAP criteria

4.6.1 To assign a CAP rating to the ship's hull for the "HULL" group, additionally to the rating received as a result of ship's hull CAP survey, the hull strength analysis for compliance with the CAP criteria shall be made.

4.6.2 Strength analysis shall be fulfilled to assign the CAP rating for ship's hull and include the following:

- analysis of ship's hull actual condition with the description of actual wear and other defects detected both during survey and upon results of studying the data of the previous repairs of hull, classification society reports, etc.;
- check of the ship's hull longitudinal strength in accordance with the thickness measurements report in, ~~at least, three~~ transverse sections, in accordance with 4.5.1.1 within the amidships (in the area of cargo holds/tanks, one of which shall be amidships and others—forward and aftward), including comparison of the actual hull section modulus with tolerable wear specified in the RS rules according to the RS requirements for **CAP1**, **CAP2** and **CAP3** ratings (refer to 4.2.2). Reduction of longitudinal structural members losing stability under overall bending forces when calculating strength is not allowed;
- check of the ship's hull geometric characteristics, including comparison of actual thickness of plates, beam walls ~~and modulus of resistance~~ of hull wearable members with the RS requirements for **CAP1**, **CAP2** and **CAP3** ratings (refer to 4.2.2);
- check of fatigue strength of hull structures, including determination of residual service life of ship and comparison with the RS requirements for **CAP1**, **CAP2** and **CAP3** ratings (refer to 4.2.2 and 4.6.3);
- check of geometric characteristics of ship's hull with wear for absence of **CAP4** rating elements (if any, the overall CAP rating becomes **CAP4**);
- graphical representation of hull structure wear curves and CAP rating evaluation for each group of webs. CAP rating is determined with 10 % coverage (90% cumulative level) for all taken measurements for each group of webs (at least the following groups of webs shall be considered: plates and beams of side shell plating; plates and beams of strength deck plating; plates and beams of bottom shell plating with bilges; plates and beams of tank top plating; double side plates and beams/longitudinal bulkheads; longitudinal coamings). Recommendations for the design of cumulative distribution curves of thickness diminutions (wear curves) of hull structures are given in Appendix ~~C3~~.

4.6.3 Check of the ship's hull fatigue strength, including determination of residual service life is mandatory for ships with deadweight of 20 000 t and above and 20 years of age and above.

Calculation of fatigue strength and determination of residual service life are carried out for the following structures:

- intersections of the upper deck and bottom longitudinal beams with transverse bulkhead in, at least, three transverse sections along the ship's hull length in the area of cargo holds;
- intersections of the upper deck and bottom longitudinal beams with deep beams and floors in, at least, three transverse sections along the ship's hull length in the area of cargo holds;
- connections of the lower double side sloping plate and tank top plating in, at least, three transverse sections along the ship's hull length located in the middle of the cargo hold length;
- for all the repaired structures in case the repair was caused by cracks or other damages of fatigue nature irrespective of the structure location area.

For the ships with deadweight of less than 20 000 t and/or less than 20 years of age, RS may require fatigue endurance calculations based on results of the ship's hull survey and review of available documentation on the performed ship's hull repair (in case of fatigue cracks, in case of repairing fatigue cracks regularly appearing while in service).

Fatigue strength calculation procedure shall be agreed with the Register and meet the following minimum requirements:

- linear accumulated damage hypothesis shall be used; general requirements to the calculation procedure are given in IACS Recommendation No. 56, it is allowed to use main provisions of the procedure specified in the Collection of Regulating Documents, Book Eleven;
- design loads are determined using beam theory or finite-element method and one of the methods to determine loads acting on the ship's hull (simplified calculation procedure according to the RS rules or direct calculation using spectral method);
- calculation shall be carried out based on actual technical condition of the hull structures.

4.6.4 When issuing a report on the results of hull strength calculations for compliance with CAP criteria, it is necessary to follow the recommendations of ND No. 2-060203-028. The number of the report is assigned in accordance with 5.1.3 of RD No. 2-060203-028, the report is certified by the signatures of the contractor and the head of the unit and the necessary details in accordance with 5.1.4 of RD No. 2-060203-028.

4.7 CAP Report

4.7.1 The CAP Report for the "**HULL**" group shall contain, at least, the following main sections:

- general information on the ship, including status of classification and statutory surveys of the ship;
- description of the system used to assign ratings and verbal descriptions;
- Checklist on Ship's CAP **HULL** Survey, photos confirming technical condition;
- calculation of hull strength for compliance with the CAP criteria to assess overall and local strength as well as fatigue strength for the "**HULL**" group;
- information on the performed repair of the hull structures prepared according to Annex **B2**;
- calculation of CAP rating for the hull ("**HULL**" group);
- conclusion.

4.7.2 The CAP Report for the "**MACHINERY, SYSTEMS**" group shall contain, at least, the following main sections:

- general information on the ship, including status of classification and statutory surveys of the ship;
- Checklist on Ship's CAP **MACHINERY, SYSTEMS** Survey, photos confirming technical condition;
- information on the performed repair of the machinery and systems prepared according to Annex **B2**;
- calculation of CAP rating for ship's machinery and cargo systems;
- calculation of overall CAP rating ("**MACHINERY, SYSTEMS**" group);
- conclusion.

4.7.3 When performing CAP for two groups ("**HULL**" and "**MACHINERY, SYSTEMS**" groups), it is allowed to prepare one report containing information provided in 4.7.1 and 4.7.2. When issuing a report on the implementation of the CAP, it is necessary to be guided by the recommendations of ND No. 2-060203-028. The number of the report is assigned in accordance with 5.1.3 of RD No. 2-060203-028, the report is certified by signature of 320 and sealed in accordance with 5.1.4 of RD No. 2-060203-028.

4.7.4 When performing CAP for two groups ("**HULL**" and "**MACHINERY, SYSTEMS**" groups) in the CAP Certificate (form 3.1.12), rating score shall be specified for each group (for example, **CAP1 – HULL** and **CAP2 – MACHINERY, SYSTEMS**).

4.7.5 The CAP Certificate (form 3.1.12) shall not be issued in case of assigning **CAP3** and **CAP4** ratings to the ship. The letter of conclusion with the CAP Report containing CAP rating justification shall be sent to the shipowner and the RS Branch Office for in-service supervision.

4.8 Arranging work on CAP execution

4.8.1 When arranging the RS work on CAP execution the instructions in Table 4.8.1 shall be followed.

Table 4.8.1

Action	Responsible division	Time frame
Review of the shipowner's Request	Division 320	Within 2 working days upon receipt of the Request.

Review of documents. Making a decision on possibility of CAP execution in principle and sending information to Division 210 to arrange ship's survey	Division 320	Within 10 working days upon receipt of the complete set of documents (Annex A Annex 1).
Arrangement of ship's survey. Sending instruction to the RS Branch Office considering the place and date of survey agreed with the shipowner.	Division 210	Within 5 working days after making a decision on CAP execution in principle by Division 320.
Ship's survey.	RS Branch Office (on behalf of Division 210)	Determined by intermediate results of the survey.
Preparation of survey checklists. Sending records on survey (checklists, photos, issued in the form of annexes to the CAP Report, in accordance with Annex 4 , test results) to Division 210.	RS Branch Office (on behalf of Division 210)	Within 5 working days after survey completion.
Control check of the records on survey. Sending records on survey to Division 320.	Division 210	Within 5 working days after survey completion.
Review of hull strength calculation for compliance with CAP criteria.	Division 320	Within 15 working days upon receipt of the calculation.
Assigning the total CAP rating. Preparing a final CAP Report. Issuing a CAP Certificate (form 3.1.12). Sending documents to the shipowner and Ship's File.	Division 320	Within 10 working days upon receipt of the survey report and agreement of strength calculations.

4.8.2 Hull strength calculations for compliance with the CAP criteria may be performed by Division 320 or by a recognized organization as agreed with the shipowner. Calculation deadlines shall be agreed with the shipowner.

4.8.3 During the CAP survey, the RS surveyor shall follow the requirements of the [Rules for the Classification Surveys of Ships in Service](#), [Guidelines on Technical Supervision of Ships in Service](#) and other RS normative documents used during survey of ships in service. For safe CAP survey, ND No. [2-170101-001](#) – Occupational Safety Instructions for RS Surveyors Conducting Survey of Ships and Items of RS Technical Supervision shall be used.

4.8.4 For CAP survey the most experienced RS surveyors with open areas of activities (at least for special surveys with specialization in hull and annual surveys with mechanical and electrical specializations) shall be assigned. The shipowner shall provide safe survey of the ship to be carried out by the Register. To provide safe CAP survey of the ship, the shipowner shall meet the applicable requirements of the [Rules for the Classification Surveys of Ships in Service](#) (at least Section 4 of Part I "General", Section 1 of Part III "Additional Surveys of Ships Depending on Their Purpose and Hull Material").

Annex A1. List of Information Submitted ~~to~~by the Ship Owner

1. Group of items to assess actual technical condition of the ship (HULL/MACHINERY, SYSTEMS).
2. Name, registry number, IMO number, port of registry, flag, type, date of build, gross tonnage, class notation. Overall length, width, freeboard, summer draught, propulsion type.
3. Type of main machinery, total power.
4. Type and material of propeller shaft, propeller shaft liners, lubrication system of sterntube bearings, type of shaft to propeller connection.
5. Information on introduction of ship into propeller shaft/shafting condition monitoring (PCM/SCM) system, date of bringing the ship to PCM/SCM system (if any).
6. Information on planned date and place of ship submission (if any), details of agent in ship submission port.
7. General arrangement plan of the ship.
8. Depending on the selected group of CAP items: drawings of hull, mechanical and electrical installations of the ship, diagrams of ship systems;
9. List of ship machinery, arrangements, systems, including cargo system.
10. Copy of Classification Certificate and other certificates, if any.
11. If applicable: reports, checklists, ACS – IACS member reports on condition of the hull, as minimum, last special and subsequent surveys of the ship.
12. Thickness measurement reports, repair reports prepared according to Annex ~~B-2~~ and other documents concerning actual technical condition of the ship hull for the operation period preceding the CAP execution.
13. Ship' hull damage history for the entire service period of the ship.
14. Information on transported cargoes and operation areas for the last 3 years of ship service.
15. Planned maintenance system (PMS) documentation, if any, for ship's machinery and cargo system (maintenance schedules; documents confirming fulfillment of PMS operations and schedules); documents demonstrating technical condition before and after maintenance; documents with records on accidents, failures and emergencies, replacement and repair of CAP items.
16. Records of technical condition and/or worksheets for checking technical condition of machinery, or specially developed forms of records for the results of technical condition monitoring during maintenance. The documents submitted shall contain the results of surveys and measurements carried out during maintenance, as well as limit values of technical condition parameters (sizes, clearances, condition of surfaces, etc.) determined by the manufacturer or other recognized organization. Causes of failures, emergencies, replacements and repairs shall be specified.
17. Information on cathodic protection installation, instruction on renewal of anodes fitted on the ship's outer hull afloat.
18. Specification of cathodic protection and its installation diagram.
19. Copy of document confirming introduction of ship into PCM/SCM system.
20. Copy of document confirming introduction of ship into PMS system.

Annex B2. Format of Submitting Information on Performed Repair for Final CAP Report

Table 1

Элемент корпуса Hull member	Выявленный дефект Defect detected	Выполненный ремонт (замена, подкрепление и т.п.). Ссылка на акт РС Repair performed (replacement, reinforcement, etc.). Reference to RS report	Дата ремонта Date of repair

Table 2

Элемент механизма/устройства/системы Machinery/equipment/system element	Выявленный дефект Defect detected	Выполненный ремонт (замена, подкрепление и т.п.). Ссылка на акт РС Repair performed (replacement, reinforcement, etc.). Reference to RS report	Дата ремонта Date of repair

Annex **C3**. Recommendations for the design of cumulative distribution curve of thickness diminutions of hull structures

In accordance with 4.6.2, the results of the actual strength calculations shall be presented in graphical form, using the cumulative distribution curves of thickness diminutions (wear curves) of hull structures with an assessment of the CAP rating for each link group. The CAP rating is determined with 10% coverage (90% cumulative level) for all performed measurements for each structural group.

At least the following groups of structures shall be considered:

- plates and beams of side shell plating;
- plates and beams of strength deck plating;
- plates and beams of bottom shell plating with bilges;
- plates and beams of double bottom plating;
- double side plates and beams/longitudinal bulkheads;
- longitudinal coamings.

The cumulative distribution curves of thickness diminutions (wear curves) are a distribution function of the probability values of obtained values of thickness diminutions of hull structures and describe the probability that the thickness diminution of the structure in some point will take on a value less than or equal to some number. Another name for "integral distribution function" or "cumulative distribution function".

The curves of thickness diminutions (wear curves) of hull structures can be build using programs for statistical data processing or Microsoft Excel program (see Figure C-1). Figure C-1 shows that 90% of the hull structures has an actual thickness diminution of less than 35% relative to Class allowable margin and receives rating CAP1.

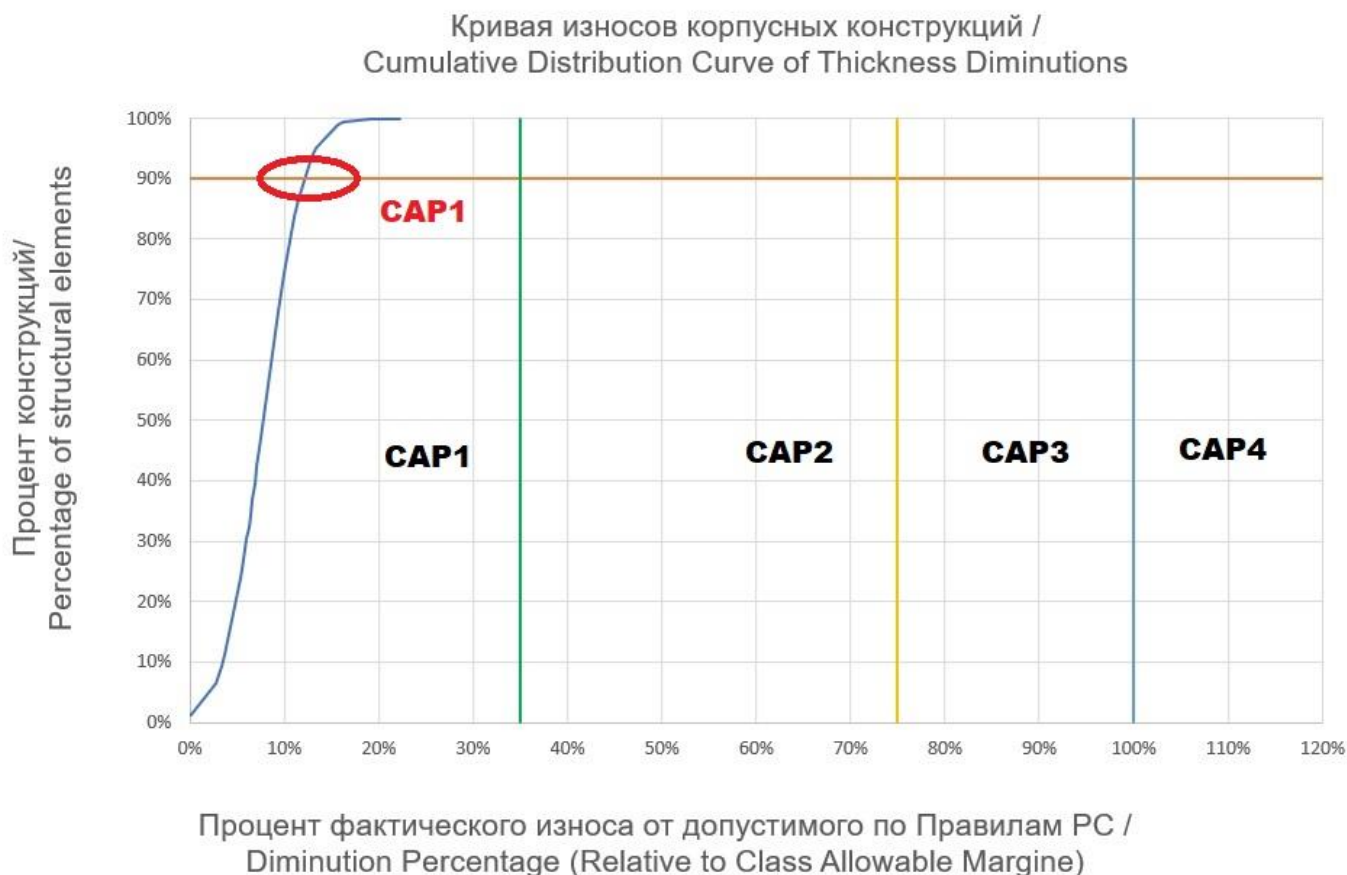


Figure C-1. The cumulative distribution curve of thickness diminutions.

Annex 4. The structure of attachments with photographic materials based on results of the survey of the ship for the CAP Report.

In accordance with 4.8.1, based on the results of the survey of the ship, photographic materials are drawn up as attachments to the CAP Report.

When performing CAP for objects of the “HULL” group, the following application structure is recommended:

ANNEX 1.2 – HULL PHOTO REPORT

1. Ship's superstructure/deckhouse (from outside)
2. Underwater and above water hull area upper deck incl. (from outside)
3. Rudder, Tailshaft and Thruster
4. Cathode protection
5. Propeller
6. Anchor and anchor chain
7. Bow thruster
8. Closures of openings
9. Close-up Surveys
- Water ballast tanks {list titles}
- Forepeak
- Afterpeak
- Cargo and Slop Tanks

When performing CAP for objects of the “MACHINERY, SYSTEMS” group, the following application structure is recommended:

ANNEX 2.2 – MACHINERY PHOTO REPORT

- Survey of machinery spaces
- Main Engine
- Reduction gear
- Survey of auxiliary engines (Aux diesel generator)
- №1
- №2
- №3
- Survey of power generation and distribution system
- Electrical Transformer №1
- Electrical Transformer №2
- Emergency diesel generator
- Main switch board
- Fuel Oil system
- Lubricating oil system
- Survey of compressed air system
- Survey of sea water system
- Survey of fresh water system
- Survey of fire systems

[Survey of steam and feed systems](#)

[Survey of bilge system](#)

[Survey of steering gear hydraulic system](#)

[Survey of control and safety devices](#)

[Survey of anchoring and mooring equipment](#)

[ANNEX 2.3 – CARGO SYSTEM PHOTO REPORT](#)

[Survey of Pump Room \(Cargo Control Console\)](#)

[Survey of Pump Room](#)

[Survey of cargo transfer system](#)

[Survey of ballast transfer system](#)

[Survey of inert gas system](#)

[Survey of control and safety devices](#)