

RUSSIAN MARITIME REGISTER OF SHIPPING

RULES

FOR THE SURVEYS OF INLAND NAVIGATION SHIPS IN SERVICE (for European Inland Waterways)

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Rules for the Surveys of Inland Navigation Ships in Service (for European Inland Waterways) of Russian Maritime Register of Shipping have been approved in accordance with the established approval procedure and come into force on 1 January 2021.

The present edition of the Rules is based on the 2020 edition taking into account the amendments developed immediately before publication.

In development of the Rules the technical requirements of other classification societies and governmental organizations in the Danube River Basin, and countries operating ships involved in the Danube-Main-Rhine waterway system, as well as the provisions of Directive (EU) 2016/1629 as amended by European Commission regulations (EU) 2018/970 and (EU) 2019/1668, ES-TRIN 2019/1 standard, UNECE resolutions Nos. 61, 65, 72 and 76, Recommendations on Technical Requirements for Inland Waterway Vessels of the Danube Commission, edition 2014, and the applicable international and European standards governing electrical equipment, communications, navigation, environmental protection have been taken into account.

On the entry into force of these Rules, the Rules for the Surveys of Inland Navigation Ships in Service (for European Inland Waterways), 2020 become void.

The Rules are intended for surveyors, ship crews and shipowners.

The Rules are published in electronic format in Russian and English.

In case of discrepancies between the Russian and English versions, the Russian version shall prevail.

REVISION HISTORY

(purely editorial amendments are not included in the Revision History)

For this version, there are no amendments to be included in the Revision History.

PART I. GENERAL PROVISIONS

1 APPLICATION

1.1 Rules for the Surveys of Inland Navigation Ships in Service (for European Inland Waterways)¹ set forth schedule, scope and methods of surveys of ships and their items for the purpose of assignment, confirmation and renewal of the ship's class in accordance with the Rules for the Classification and Construction of Inland Navigation Ships (for European Inland Waterways)².

1.2 The Rules for INS Surveys are applied by Russian Maritime Register of Shipping³ during surveys of ships in service, as well as during repair or conversion, which are covered by the requirements specified in 1.3, Part I "Classification" of the Rules for INS Construction.

1.3 Fulfillment of the provisions of the Rules for INS Surveys ensures technical conditions for safe navigation of ships according to their purpose, safety of human life, environmental protection and safe carriage of cargoes on the European inland waterways.

1.4 The types, scope and schedule of surveys of ships for the purpose of verification of their compliance with the Rules for INS Construction and other normative requirements of the Register are regulated by the relevant sections of the Rules for INS Surveys.

Transitional provisions contained in the relevant articles of the edition of ES-TRIN standard in force according to the provisions of Annex II to Directive (EU) 2016/1629 as amended shall be additionally followed when determining the scope of survey for ships in service covered by the requirements of Directive (EU) 2016/1629 as amended, and not navigating on Zone R waterways. For ease of reference, the table of correspondence between the requirements of the Rules for INS Construction and the above mentioned transitional provisions is given in Appendix 2 to the Rules for INS Surveys.

1.5 Recommendations on technical supervision of ships in service, under repair or conversion are set forth in Appendix 3 to these Rules.

1.6 Recommendations on surveys and tests related to the technical supervision of materials and products used during repair and replacement, as well as technical supervision during welding and heat treatment are set forth in the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships and in the Guidelines on Technical Supervision of Ships under Construction.

1.7 The Rules for INS Surveys are mandatory for all shipowners, organizations, firms and individuals involved in operation of ships. The above-mentioned organizations, firms and individuals ensure the fulfillment of the requirements of the Rules for INS Surveys, performance of the RS technical supervision, submission of the necessary documentation to the RS surveyors and the fulfillment of the requirements of the RS surveyors issued upon the survey results.

1.8 The possibility of deviation from certain requirements of the Rules for INS Surveys is determined by the Register Head Office (RHO), provided the shipowner submits the technical background and the conclusion of the RS Branch Offices on in-service supervision.

1.9 The RS classification activities do not preclude the set activities of other state supervision bodies, shipowners, Flag State maritime administrations and port administrations.

1.10 The fees for the supervision carried out are charged by the Register according to the pricing system established by the Register. In case of non-fulfillment or improper fulfillment of the obligations to the Register, including the payment for its services, the Register has a right not to assign the class or, when the class has been already assigned, to suspend or withdraw the class of the ship, on which the obligation to the Register, including the payment for its services, has not been fulfilled or has been improperly

¹Hereinafter referred to as "the Rules for INS Surveys".

²Hereinafter referred to as "the Rules for INS Construction".

³Hereinafter referred to as "the Register", "RS".

fulfilled, and to withdraw (make an entry of invalidity) documents issued by the Register. Payment of invoices submitted by the Register for the survey is made per existing scale of fees or on the basis of an agreement between a shipowner/firm and the RS Representation. Survey carried out by the RS Representation initiative is not invoiced, however, the surveys aimed to eliminate the comments made in the course of the initiative survey are paid for on common terms.

1.11 Conditions for preparation to surveys are given in the Rules for Classification Surveys of Ships in Service.

2 DEFINITIONS AND ABBREVIATIONS

2.1 DEFINITIONS

2.1.1 Definitions relating to general terminology are given in 1.1, Part I "Classification" of the Rules for INS Construction, Section 2, Part I "General Provisions" of the Rules for the Classification Surveys of Ships in Service, in the Guidelines on Technical Supervision of Ships in Service, and in the Recommendations on Technical Requirements for Inland Waterway Vessels of the Danube Commission, edition 2014 (hereinafter referred to as "the Danube Commission Recommendations 2014").

For the purpose of the Rules for INS Surveys, the following definitions have been additionally adopted.

A g e o f s h i p is a period of time (a number of full years) between the date of the ship construction and the current date. The age of a ship (or the date of construction) cannot be changed as the result of major conversion, modernization or renovation of the ship hull.

A n n i v e r s a r y d a t e is the date and month of each year corresponding to the expiry date of validity of the Classification Certificate issued in accordance with 2.4.1.4.5 — 2.4.1.4.9, Part II "Survey Schedule and Scope" of the Rules for the Classification Surveys of Ships in Service.

C a n c e l l a t i o n o f d o c u m e n t s is a procedure of termination of the ship documents consisting in an entry to be made by the RS surveyor in the Survey Report and, whenever practicable, in the Classification Certificate itself to the effect that the Certificate ceases to be valid (loses its validity) due to the reasons of cancellation, as well as in case of non-fulfillment or improper fulfillment of the shipowner/proprietor commitments to the Register including commitments on payment for its services or payment of a penalty. Procedure for cancellation of documents may cover documents issued on behalf of the Flag State Administration provided its appropriate directions are available.

C l o s e - u p s u r v e y is a survey where the details of structural components are within the close visual inspection range of the surveyor, i.e. normally within reach of hand.

C o a t i n g c o n d i t i o n is defined as follows:

G O O D condition with only minor spot rusting;

F A I R condition with local breakdown 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 **P O O R** condition;

P O O R condition with general breakdown of coating over 20 % or more, or hard scale at 10 % or more, of areas under consideration.

C o n f i r m a t i o n o f c l a s s is a confirmation of class validity in the Classification Certificate in case of the satisfactory results of the annual (intermediate) survey.

C r a n k i n g o f m a c h i n e r y is periodical propulsion of driving mechanisms and equipment by means of driving gears or manually by rotating not less than one revolution/cycle and installation of these elements in new position.

D a t e o f i s s u e is the date of completion of the ship survey resulting in issue of an appropriate certificate.

D a t e o f s u r v e y is the date stated in documents confirming the survey performance, in the report (if several reports are available, the date of the latest one), certificate.

E u r o p e a n i n l a n d w a t e r w a y s are a list of Community inland waterways divided geographically into **Zones 1, 2, 3 and 4** (refer to the Appendix to Part I "Classification" of the Rules for INS Construction).

E x c l u s i v e s u r v e y o r is an individual who has concluded the contract of employment exclusively in the RS Branch Office and has adequate qualification and background and is authorized to perform duties and activities entrusted with by the employer within his terms of reference.

Operator is an individual or legal entity, which operates the ship on the basis of agreement with a proprietor or shipowner.

Overall survey is a survey intended to report on the overall conditions of the hull structure and determine the extent of additional close-up surveys.

Owner is an individual or legal entity, which owns the ship on the basis of proprietor's rights with no regard whether he operates the ship himself or places under the trust management or the other type of management to other party on the legal grounds.

Passenger capacity is the maximum number of passengers allowed on board a particular ship.

Prompt repair is the repair made without delay during the survey.

Reassignment of RS class is a process of classification of a ship with withdrawn RS class and having no class of another classification society (ACS) — IACS member over 6 months from receipt of written request for reassignment of RS class.

Recognition of service supplier is a procedure for obtaining by the service supplier of recognition (approval) by the Register to perform the works, which results are used by the Register during survey of ships.

Reinstatement of class is a confirmation of class validity with the satisfactory results of the occasional survey of the ship with the class suspended on the elimination of the reason that caused the class suspension.

Renewal of class is a confirmation of the ship class validity for a new, as a rule, 5-year classification period and issue of the Classification Certificate, instead of the Certificate, which validity expired, in case of the satisfactory results of the special survey of the ship in the Register class.

Retainment of class is a confirmation of class validity in the Survey Report in case of the satisfactory results of the occasional survey carried out in connection with an accident or with replacement of the Register documents due to the change of flag, shipowner, port of registry, name of the ship or signal letters.

River-sea navigation ship is a ship intended for navigation on inland waterways and suitable for restricted navigation at sea.

Semi-hard coating is the coating, which solidifies or changes so that it retains flexibility and an ability to prevent corrosion within, at least, three years. It shall be hard enough to be touched and for walking without essential deterioration of its protective properties.

Ship in service is a ship in operation, under repairs, modernization, in renovation or lay-up with the valid Register class and all the Register documents issued, which are required for its operation.

Shipowner is an individual or legal entity, which operates the ship on its own behalf with no regard whether he is the owner of the ship or he uses it on other legal grounds.

Substantial corrosion is an extent of corrosion such that assessment of corrosion pattern indicates a wastage in excess of 75 % of allowable margins, but within acceptable limits.

Survey is an integral part of technical supervision comprising:

- verification of the ship documents, approved technical documentation, certificates of conformity for materials and components;

- verification of documents on scheduled inspection carried out by competent persons or organisations;

- examination, including, if necessary, opening-up and dismantling;

- check of measurements, participation in tests, operational testing;

- monitoring of production processes;

- issue of the required Register documents or their endorsement;

- branding and sealing of items of technical supervision, if necessary.

Surveyor's inspection is checking of the ship received to or accepted from the time-charter according to the charterer's request.

Suspension of class is a notification of the shipowner that the validity of the ship class is suspended from the date and due to the reason stated in the notification, until the moment of elimination of the reason that caused the class suspension, but not more than for 6 months after the date of class suspension.

T h o r o u g h r e p a i r is a repair made for renovation of the damaged structure in accordance with the requirements of the Rules for INS Construction up to the level when there is no necessity to set any requirements or conditions regarding the item repaired and to perform technical supervision of the latter until the next periodical survey, i.e. the repair was made to the surveyor satisfaction and no additional repair is required.

W i t h d r a w a l o f c l a s s is a notification of the shipowner that the ship's class is withdrawn from the date and due to the reason stated in the notification, with termination of the RS technical supervision and cancellation of the Classification Certificate validity.

Z o n e R is those of the waterways referred to in the Appendix to Part I "Classification" of the Rules for INS Construction for which certificates shall be issued in accordance with Article 22 of the Revised Convention for Rhine Navigation as that Article is worded on 6 October 2016.

2.2 ABBREVIATIONS

2.2.1 ADN — European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways adopted by the ADN Administrative Committee including the ADN Regulations, applicability of which is specified directly in the current version of the ADN Regulations (the ADN Regulations can be downloaded from the website: <http://www.unece.org/trans/danger/danger.html>).

CPP — controllable pitch propeller.

GMDSS — Global Maritime Distress and Safety System.

ICE — internal combustion engine.

Directive (EU) 2016/1629 — Directive of the European Parliament and of the Council of 14 September 2016 laying down technical requirements for inland waterway vessels¹.

UNECE — The United Nations Economic Commission for Europe.

ACS — another classification society.

IMO — International Maritime Organization.

ISO — International Organization for Standardization.

LSA Code — the International Life-Saving Appliance Code.

FSS Code — the International Code for Fire Safety Systems.

1966 LL Convention — The International Convention on Load Lines, 1966.

IACS — International Association of Classification Societies.

MARPOL 73/78 — International Convention for Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto.

IEC — International Electrotechnical Commission.

ADN Regulations — the regulations enclosed to European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN).

INS — inland navigation ship.

CSS — Continuous Survey System.

SOLAS 74/78 — International Convention for the Safety of Life at Sea, 1974, as modified by the Protocol of 1978 relating thereto.

ES-TRIN standard — European standard developed and periodically revised by the European Committee for drawing up standards in the field of inland navigation (CESNI), and laying down technical requirements for inland navigation vessels applied in accordance with Annex II to ES-TRIN to the vessels covered by the provisions of that Directive².

¹As amended by European Commission regulations (EU) 2018/970 of 18 April 2018 and (EU) 2019/1668 of 26 June 2019, which have entered into force by 1 January 2020. Directive (EU) 2016/1629 replaces the technical requirements for inland waterway ships set out previously by Directive 2006/87/EC of 12 December 2006, which is repealed with effect from 7 October 2018.

²In accordance with amendments made to Annex II to Directive (EU) 2016/1629 by Commission Delegated ES-TRIN of 26 June 2019, for the purpose of that Directive, the ES-TRIN 2019/1 shall be applied from 1 January 2020. Electronic editions of the standards developed by CESNI (including the ES-TRIN standard) can be downloaded from the official website of the Committee (www.cesni.eu).

3 TYPES AND BRIEF DESCRIPTION OF INS SURVEYS

3.1 TYPES OF INS SURVEYS

3.1.1 The following types of classification surveys are applied during technical supervision of ships and refrigerating plants in service:

- .1** initial surveys;
- .2** periodical surveys:
 - .2.1** intermediate survey;
 - .2.2** special survey;
 - .2.3** survey of the outside of the ship's bottom;
 - .2.4** survey of refrigerating plants;
 - .2.5** surveys within the CSS scope;
- .3** occasional surveys:
 - .3.1** associated with suspension, reinstatement or withdrawal of class;
 - .3.2** at the ship lay-up and reactivation;
 - .3.3** at the ship conservation and reactivation after conservation;
 - .3.4** associated with emergency occurrences;
 - .3.5** associated with verification of the implementation of set (imposed) before requirements;
- .4** other surveys.

Brief description of surveys listed in this Chapter is given below in 3.2 to 3.5.

3.2 INITIAL SURVEY

3.2.1 The aim of the initial survey of a ship in service is to determine whether it is possible to assign class to a ship being submitted for the RS classification for the first time, or constructed without the RS technical supervision, to re-assign the RS class to the ship, the RS class of which was withdrawn, to reinstate the RS class to the ship, the class of which was suspended, as well as to change the existing notation of the RS class and to assign new class notation (only for items of technical supervision related to the new distinguishing mark or descriptive notation in the class notation).

3.2.2 The Register may assign a class to a ship that has not been classed earlier, or which class assigned by ACS is no longer valid, provided the ship is submitted for the initial survey for assignment of class.

3.2.3 A ship, which has an ACS valid class may be classed by the Register provided this ship is submitted for the initial survey in the scope of survey for confirmation of class. Upon satisfactory results of the survey, the Register may assign a class to the ship for a period of validity of the Classification Certificate available onboard.

3.2.4 For the Register classification of a ship holding an ACS class or a ship, which class assigned by ACS is no longer valid, the following documentation shall be submitted:

.1 the latest Classification Certificate and, where necessary, Seaworthiness Certificate (Ship Certificate);

.2 the reports of surveyors to ACS on the surveys held, dating from the last special survey for the class renewal;

.3 detailed description (specifications);

.4 general arrangement plan;

.5 midship section plan with the most typical structural transverse sections;

.6 design profile;

.7 shell expansion;

.8 deck plan and watertight bulkhead drawings;

.9 drawings of stem and stern frame, rudder and rudder stock;

.10 Stability Booklet (for ships where such information is required);

.11 drawings of fire-protection divisions, fire extinguishing systems and fire-fighting equipment;

.12 general arrangement plan of machinery, boilers and equipment in machinery and boiler spaces and emergency sources of power spaces with indication of escape routes;

.13 drawing of shafting and sterntube arrangement;

.14 piping diagram (including sounding, air and overflow pipes);

.15 diagram of electrical circuits, as well as circuit diagrams main and emergency switchboards.

If any of the above documents are not submitted by the shipowner, the latter shall ensure that all the required information is submitted to the Register at initial survey for assignment of class.

3.2.5 For the Register classification of a ship in service with no class assigned, technical documentation in the scope specified in Appendix 1 and agreed upon with the Register in each particular case shall be submitted.

3.2.6 When ships in service, which had no RS class, are accepted for technical supervision, the initial survey shall be carried. Initial survey of a ship consists of thorough examinations, inspections, tests and measurements, which scope is determined depending on the ship's age, its technical condition, as well as technical documentation and certificates of recognized and competent supervisory bodies being available. Initial survey is assigned in the scope of special survey including survey of the outside of the ship's bottom in dry dock.

Reduction of the scope of initial survey may be allowed if there are valid classification certificates and documents of the competent supervisory bodies. However, the scope of initial survey shall not be less than the scope of intermediate survey.

3.2.7 During initial survey the area of navigation, freeboard of the ship shall be established or confirmed (with assessing strength, stability and unsinkability), and for passenger ships, passenger capacity shall be established additionally.

3.3 PERIODICAL SURVEYS

Periodical (intermediate or special) surveys for confirmation of class are carried out within the time period specified in 4.1 and 4.2.

The scope of periodical surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure" and in the relevant chapters of the said Part.

The extent of particular examinations, measurements, testing, etc. is determined by the surveyor to the Register proceeding from valid instructions and current situations.

The scope of periodical surveys for ships listed in 2.2.2.2 and 2.2.2.3, Part I "Classification" of the Rules for INS Construction shall not be less than those given in Table 1.3, Part II "Survey Schedule, Scope and Procedure" of the Rules for INS Surveys. Where necessary, the surveyor to the Register may require expanding the scope of surveys for these ships.

Prior to commencement of survey, it shall be ascertained that the shipowner has prepared the ship for survey and provided necessary facilities for qualitative and safe execution of surveys and testing of items.

3.3.1 Intermediate survey.

3.3.1.1 Intermediate surveys shall be carried out between initial and special survey and intended to ascertain that the ship complies to a sufficient degree with the conditions of class retainment, as well as to check the operation of machinery, devices and equipment covered by the requirements of the Rules for INS Construction.

3.3.1.2 During intermediate surveys of a ship, its hull, arrangements and equipment and outfit, machinery installations, fire protection, systems and piping, electrical equipment and automation equipment are checked with regard to any changes the list, completeness, design, arrangement and installation of items of supervision, as well as their technical condition.

3.3.1.3 During intermediate survey, it is checked that the ship continues to comply with the stability and subdivision conditions as stated in the appropriate Information on Stability Booklet and Damage Stability Booklet approved by the Register, and for passenger ships, passenger capacity shall be checked additionally.

3.3.1.4 Intermediate surveys of a ship consist mainly of an external examination of items and their operational testing.

Summarized scope of surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure" and in the relevant chapters of the said Part.

3.3.1.5 During intermediate survey, the shipowner shall submit the technical documentation in the scope required for verification of compliance with the technical requirements, parameters and characteristics regulated by the Rules for INS Construction, as well as the ship documentation (documents of classification and other competent supervisory bodies, manufacturers' certificates, etc.). In case the shipowner fails to submit the technical documentation in the adequate extent, measures shall be taken for provision of the information required, with making calculations, where necessary, tests and drawings.

3.3.2 Special survey.

3.3.2.1 Special survey for class renewal shall be carried out for ships with expired class and intended for determining whether the ship's technical condition and structural and composition modifications of its items comply with the requirements of the Rules for INS Construction.

Summarized scope of surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure" and in the relevant chapters of the said Part.

At the shipowner's request, ship's certain items of technical supervision may be surveyed in the scope of special survey when their service life specified in the maintenance manuals expires or proceeding from operation experience. During special survey of the whole ship such items may be surveyed in the scope of annual survey.

3.3.2.2 Special survey shall include survey of the outside of the ship's bottom in dry dock in compliance with 4.5, Part II "Survey Schedule, Scope and Procedure".

3.3.2.3 During special surveys of the ship, those items may not be surveyed (including survey in dry dock) which have been surveyed in the necessary scope within 6 months before the date of the survey concerned.

Such items shall be surveyed in the scope required for confirmation of class.

3.3.2.4 The fourth and subsequent special surveys of ship hull shall be carried out in the scope prescribed for the third special survey. In this case, the scope of examinations, residual thickness measurements and tests for tightness shall be decided by the surveyor having regard to the previous repairs and replacements of hull structures.

3.3.2.5 During special survey, the shipowner shall submit the technical and ship documentation (documents of classification and other competent supervisory bodies, manufacturer's certificates, etc.) in the scope required for verification of compliance with the technical requirements, parameters and characteristics, regulated by the Rules for INS Construction, also the shipowner shall prepare a ship for survey and provide necessary conditions for survey and testing of the items.

3.3.3 Survey of refrigerating plants.

3.3.3.1 Recommendations on surveys of refrigerating plants are set forth in Part IV "Survey of Refrigerating Plants" of the Rules for the Classification Surveys of Ships in Service.

3.3.4 Continuous Survey System.

3.3.4.1 At the shipowner's request, the Register establishes the Continuous Survey System (CSS) of the ship: hull, arrangements, machinery, electrical equipment, refrigerating plant.

3.3.4.2 Continuous survey consists of the distribution of survey scope corresponding to the scope of special survey for class renewal between separate surveys, and the whole cycle of survey shall be conducted within the period, for which the class is assigned or renewed.

Recommendations on implementation and application of CSS on ships are set forth in 2.6, Part II "Survey Schedule and Scope" of the Rules for the Classification Surveys of Ships in Service.

3.4 OCCASIONAL SURVEYS

3.4.1 Surveys for suspension, reinstatement, reassignment or withdrawal of class.

3.4.1.1 The ship class is suspended by the Register in the following cases:

due to failure to submit the ship for surveys (intermediate/special) in due time;

due to failure to fulfil imposed requirements or class conditions;

due to failure to pay invoices for the performed survey.

The procedure for suspension and withdrawal of class is set forth in Section 4, Part II "Carrying Out Classification Surveys of Ships" of the Guidelines on Technical Supervision of Ships in Service.

3.4.1.2 Surveys for suspension, reinstatement, reassignment of class are set forth in Section 4, Part II "Carrying Out Classification Surveys of Ships" of the Guidelines on Technical Supervision of Ships in Service.

3.4.2 Lay-up and reactivation surveys.

3.4.2.1 The scope of lay-up survey, conditions of class retainment for a laid-up ship, and scope of reactivation survey are set forth in 4.10, Part II "Survey Schedule and Scope" of the Rules for the Classification Surveys of Ships in Service.

3.4.3 Conservation and reactivation surveys.

3.4.3.1 The scope of conservation and reactivation surveys are set forth in 4.11, Part II "Survey Schedule and Scope" of the Rules for the Classification Surveys of Ships in Service.

3.4.4 Surveys in connection with emergency occurrences.

3.4.4.1 Instructions on performance of surveys of ships in connection with emergency occurrences, as well as investigations and review of causes of emergency occurrences, submission of information and issuance of documents are set forth in Section 7, Part II "Carrying Out Classification Surveys of Ships" of the Guidelines on Technical Supervision of Ships in Service.

3.5 OTHER SURVEYS

3.5.1 Subject to special agreement and/or authorization, the Register may carry out other surveys.

Authorisations may be single type (request, letter) or long-term type (contract, agreement, legislative act of Flag State, etc.) limited or unlimited as to their period of validity.

The above mentioned authorizations, as a rule, are submitted to the Register via RHO for organization and control of their execution by the relevant Register Representations.

Single urgent authorizations may be locally accepted by the Register Representations, provided RHO is immediately notified to agree the subsequent actions to perform the authorization.

There are following types of surveys carried out on such authorizations:

surveys carried out on authorization of state technical supervisory bodies;

surveys of ships received to or accepted from the time-charter;

surveys associated with confirmation of damage claims;

surveys of ships to be written off from active fleet;

surveys of ships during change of shipowner, port of registry and name;

pre-sale survey of ships.

Instructions on carrying out the above surveys of ships and issuance of documents are set forth in Section 4, Part II "Survey Schedule and Scope" of the Rules for the Classification Surveys of Ships in Service.

3.5.2 During surveys, it shall be checked by the Register whether the competent supervisory bodies have carried out mandatory periodical examinations of instruments, equipment and outfit and their service life which are reduced to checking the timeliness of such examinations and observance of the service lives during periodical surveys of the ship.

This refers to:

periodical surveys of inflatable liferafts, their containers, release units, inflated rescue boats and rescue boats, which are a combination of rigid and inflated construction, inflatable lifejackets;

periodical surveys of thrusters;

hydraulic tests and internal examinations of carbon dioxide cylinders belonging to fire extinguishing systems;

periodical surveys and tests by a competent person authorized by the shipowner of pressure vessels and heat exchangers not subject to the Register survey;

calibration of instrumentation by the competent supervisory body;

service life of fire extinguishing medium in fire extinguishing systems and fire extinguishers;

checking by competent supervisory bodies of the self-contained breathing apparatuses, fireman's outfit.

Submission of items for mandatory periodical examinations carried out by the competent supervisory bodies within time stipulated by the current provisions and replacement of items with expired service life is the responsibility of the shipowner.

The specified dates of mandatory periodical examinations of the items and their expiry dates shall not affect the process of setting the due dates for ship surveys and the period of validity of certificates, however during periodical surveys of ships, the surveyor shall demand the performance of mandatory examinations and tests within the specified time and replacement of items to be surveyed if their service life has expired.

4 TERMS OF PERIODICAL SURVEYS OF SHIPS

4.1 SCHEDULE OF SPECIAL SURVEYS

4.1.1 For existing RS-registered ships, the class is assigned or renewed by the Register, as a rule, for 6-year period for self-propelled ships and for 8-year period for non-self-propelled ships provided the intermediate surveys for class confirmation are carried out within the specified periods.

In well-grounded cases the Register may assign or renew the class for a lesser period.

Provisions of Directive (EU) 2016/1629 as well as transitional provisions contained in the relevant articles of the edition of ES-TRIN standard in force according to provisions of Annex II to Directive (EU) 2016/1629 as amended shall be additionally followed when assigning the dates of special survey for existing RS-registered ships covered by the requirements of Directive (EU) 2016/1629 as amended, and not navigating on Zone R waterways.

4.1.2 For new ships complying with the requirements of Directive (EU) 2016/1629 as amended, the class is assigned or renewed by the Register for 5-year period for passenger ships and high-speed craft and 10-year period for other types of ships provided the intermediate surveys for class confirmation are carried out within the specified periods.

4.2 SCHEDULE OF INTERMEDIATE SURVEYS

4.2.1 The following due dates of intermediate surveys shall be set for existing RS-registered ships:

.1 intermediate surveys of passengers ships, ships navigating in ice, oil tankers, ships carrying dangerous cargoes, dynamically supported craft and air cushion vehicles shall be carried out every 12 months;

.2 surveys of others ships — every 24 months from the date of special or initial survey.

4.2.2 The following due dates of intermediate surveys shall be set for the new ships complying with the requirements of Directive (EU) 2016/1629 as amended:

.1 surveys of passenger ships, ships navigating in ice, oil tankers, ships carrying dangerous cargoes, dynamically supported craft and air cushion vehicles shall be carried out every 12 months;

.2 surveys of other ships — every 30 months from the date of special or initial survey.

4.2.3 Intermediate surveys for confirmation of class shall be carried out within the time period specified in 4.2.1 and 4.2.2, within 3 months before or after the specified dates but without affecting the due dates of subsequent special surveys.

4.3 SCHEDULE OF SURVEYS OF THE OUTSIDE OF THE SHIP'S BOTTOM

4.3.1 Survey of the outside of the ship's bottom is a part of the periodical (intermediate and special surveys) carried out by the Register.

4.3.2 The following due dates of surveys of the outside of the ship's bottom shall be set for existing RS-registered ships:

- .1** for ships navigating in ice, dynamic support craft and air cushion vehicles — at annual intervals;
- .2** for self propelled ships — at each special survey and once in ± 9 months from the middle of the period between special surveys except the first period after ship construction;
- .3** for non-self-propelled oil tankers — at each special survey beginning from the third one;
- .4** for other non-self-propelled ships — at each special survey beginning from the third one.

4.3.3 For new ships complying with the requirements of Directive (EU) 2016/1629 as amended, the due dates of survey of the outside of the ship's bottom are set in 4.3.2.

5 INTERVALS BETWEEN PERIODICAL SURVEYS

5.1 Intervals between periodical surveys of ships classed with the Register shall be recorded from the date of issue of the Classification Certificate. If during construction of the ship it was launched more than one year prior to completion of the initial survey, the ship shall be submitted for underwater hull examination, or the date of the next special survey will be assigned from the date of ship launching.

5.2 Intervals between periodical surveys of ships in service shall be recorded from the date of completion of the special survey for class renewal being the date of issue of the Classification Certificate.

5.3 Intervals between periodical surveys of ships, which class was withdrawn, shall be recorded from the date of completion of the occasional survey (in the scope of special survey) at reassignment of class to the ship, which class was withdrawn.

5.4 Intervals between periodical surveys of a ship that had a valid class of another classification society and was classed with the Register during survey for class confirmation shall be recorded from the date of issue of the Classification Certificate by the society the ship was classed with.

5.5 Intervals between periodical surveys of a ship that has not been classed earlier shall be recorded from the date of class assignment to the ship.

5.6 If special survey for class renewal is completed within 3 months before the expiry date of special survey, the next period of class is established beginning from the expiry date of special survey. In this case the period of validity of a new Classification Certificate begins from the date of completion of the special survey until the date not exceeding the period of class established for this ship after the date of expiration of period of validity of the existing Classification Certificate.

5.7 If special survey for class renewal is completed more than 3 months before the expiry date of special survey, the next period of class is established beginning from the date of actual completion of special survey. In this case the period of validity of a new Classification Certificate begins from the date of completion of the special survey until the date not exceeding the period of class established for this ship after the date of completion of this survey.

5.8 If special survey for class renewal is completed after the expiry date of special survey, the next period of class is established beginning from the expiry date of special survey. In this case the period of validity of a new Classification Certificate begins from the date of completion of the special survey until the date not exceeding the period of class established for this ship after the date of expiration of period of validity of the existing Classification Certificate without extension of the special survey and of the existing Classification Certificate.

6 EXTENSION OF PERIODICAL SURVEYS

6.1 In well-grounded cases, upon shipowner's request, the special survey for class renewal may be extended by the Register for not more than 6 months for self-propelled and non-self-propelled ships provided the ship is submitted for occasional survey which scope is determined proceeding from the scope of survey for class confirmation. In well-grounded cases, during special survey, the particular types of items surveys may be extended by the Register for the period of not more than 12 months provided these items are submitted for occasional survey which scope is determined proceeding from the scope of survey for class confirmation.

6.2 In well-grounded cases the internal surveys of boilers may be extended for 3 months.

Hydraulic tests of boilers, as well as internal surveys and hydraulic tests of heat exchangers and pressure vessels required during special survey of a ship may be extended for the period of 12 months provided these boilers are submitted for internal survey, and heat exchangers and pressure vessels are submitted for external examination.

7 DOCUMENTS ISSUED

7.1 On completion of initial (refer to 3.2) or periodical (refer to 3.3) surveys of ships in service, the surveyor shall draw up and issue the documents confirming compliance with the requirements of the Rules for INS Construction.

Scope and number of the Register documents, their application, procedure for drawing them up, issuance and submittal can be found in the relevant Register internal procedure.

7.2 The basic documents issued to INS are:

.1 documents confirming that the ship is classed by the Register:

.1.1 Classification Certificate (form 3.1.3), which is issued for the time period specified in 4.1.1 and 4.1.2. Subject to endorsement during intermediate surveys (refer to 4.2);

.1.2 Record of Equipment and Outfit (form 4.1.3), which is an Annex to the Classification Certificate and is issued during initial survey. The validity period is unlimited;

.1.3 Classification Certificate for Classed Refrigerating Plant (form 3.1.4), which is issued for the period of validity of the Classification Certificate. Subject to endorsement during intermediate surveys;

.1.4 Pollution from Ships Prevention Certificate (form 2.4.18EC), which is issued for the period of validity of the Classification Certificate. Subject to endorsement during intermediate surveys.

.2 along with the documents specified in 7.2.1.1 to 7.2.1.4, the following documents developed by the designer or shipowner and approved by the Register shall be submitted to the ship during initial survey:

.2.1 Stability Booklet;

.2.2 Damage Control Plan;

.2.3 Loading Manual;

.2.4 Emergency, Fire and Environmental Safety Plan;

.3 documents confirming compliance with the Rules for the Tonnage Measurement of Inland Navigation Ships:

.3.1 INS Tonnage Certificate (form 1.2.13);

.3.2 INS Tonnage Measurement Protocol (form 6.7.2);

.4 document confirming compliance with the technical requirements established by the Danube Commission Recommendations 2014 is the Certificate for Inland Navigation Ships (form 2.1.49) which is issued upon authorization of the Flag State Administration. The certificate is valid until the next scheduled survey (periodical or occasional);

.5 document confirming compliance with the technical requirements established by the Directive (EU) 2016/1629 as amended is the inland navigation certificate as per form 2.1.49EC which is issued upon authorization of the Flag State Administration. The certificate validity is specified in 4.1.2. The certificate is subject to confirmation during intermediate surveys — refer to 4.2.2;

.6 documents confirming compliance with ADN Regulations:

.6.1 Certificate of approval or Provisional certificate of approval (according to the model set out in Chapter 8.6 of ADN Regulations) which is issued to dry cargo vessels carrying dangerous goods in packages or in bulk;

.6.2 Certificate of approval or Provisional certificate of approval (according to the model set out in Chapter 8.6 of ADN Regulations) which is issued to oil tankers carrying dangerous substances in tanks.

7.3 In addition to 7.2, sea-going ships to be surveyed, provided a relevant authorization is granted to the Register, for compliance with the Danube Commission Recommendations or UNECE resolutions shall carry the following documents:

.1 international certificates confirming compliance with SOLAS 74 as amended, as applicable, and/or the International Load Line Certificate (1966) as amended — for sea-going ships covered by SOLAS 74 as amended or the 1966 LL Convention as amended;

.2 certificates and freeboard marks required by the laws of their States of registry — for sea-going ships not covered by SOLAS 74 as amended or the 1966 LL Convention as amended, and shall meet the

requirements of the Conventions in respect of construction, rigging and gear, or otherwise ensure a comparable safety level;

.3 International Oil Pollution Prevention Certificate (IOPP Certificate) — for sea-going ships covered by MARPOL 73/78;

.4 Pollution from Ships Prevention Certificate (form 2.4.18EC), required by the laws of their Flag State, provided a relevant authorization is granted to the Register by this Flag State, if not covered by MARPOL 73/78. Requirements for the prevention of water pollution and abatement of noise produced by ships are given in Chapter 8B of the Danube Recommendations 2014 and UNECE resolution No. 61, as applicable.

7.4 In addition to 7.2, new river-sea navigation ships shall comply with the following requirements:

.1 new river-sea navigation ships involved in international voyages shall be covered by SOLAS 74 as amended and/or the 1966 LL Convention as amended, as applicable, and shall carry valid corresponding international certificates under the above Conventions;

.2 new river-sea navigation ships involved in coastal voyages shall carry the certificates required by the laws of their state of registry;

.3 new river-sea navigation ships involved in international voyages shall be covered by MARPOL 73/78 and shall carry valid IOPP Certificate;

.4 new river-sea navigation ships involved in coastal voyages shall carry valid Pollution from Ships Prevention Certificate required by the laws of their Flag State (e.g., form 2.4.18EC), provided a relevant authorization is granted to the Register by this Flag State. Requirements for the prevention of water pollution and abatement of noise produced by ships are given in Chapter 8B of the Danube Recommendations 2014 and UNECE resolution No. 61, as applicable;

.5 in addition to Chapter 8B of the Danube Recommendations 2014 and UNECE resolution No. 61, river-sea navigation ships involved in international voyages shall be covered by Annex VI of MARPOL 73/78 and shall carry valid International Air Prevention Pollution Certificate (IAPP Certificate).

7.5 Survey results shall be recorded by the surveyor in relevant reports and checklists, including those which, in accordance with the Register internal procedures, serve as a basis for issuance, endorsement, extension or retainment of the terms of validity of the relevant certificates.

7.5.1 By his records in reports and other documents the surveyor shall confirm only what he saw and examined during the survey. None of the Register documents can be issued to the ship without performance of a relevant survey except for the cases related to replacement/issuance of document as decided by the Register and/or Flag State Administration, issuance of duplicate documents upon the shipowner's request.

7.5.2 The documents drawn up based on survey results (reports and checklists) shall include sufficiently detailed description of the scope of survey carried out, results of measurements and tests, records of any malfunctions, damages and defects, repairs and replacements performed, technical condition of the supervised item by the completion of survey.

7.5.3 During survey, the surveyor shall record the results of examinations, inspections and tests performed with respect to the items of technical supervision in the document forms provided for that purpose and drawn up at each ship attendance.

7.5.4 Any document issued by the Register upon the survey results shall indicate the ship compliance with the applicable requirements of the Register rules, international agreements and directives on the date of survey.

PART II. SURVEY SCHEDULE, SCOPE AND PROCEDURE

1 GENERAL

1.1 Ships in service are covered by the requirements of the Rules for INS Construction according to which they were built, unless otherwise is specified in the subsequent editions of those Rules or the RS circulars. Execution of surveys and tests, the issue, extension and endorsement of the Register documents shall fully meet the requirements of the Rules for INS Surveys in force.

1.2 Having followed repairs, conversion or modernization, a ship shall, as a minimum, meet the requirements of the Rules for INS Construction previously applied to this ship.

Newly installed structures, machinery and equipment shall meet the requirements of the Rules for INS Construction in force as far as reasonable and technically practicable.

Repair work (welding, riveting and heat treatment), materials and products used during repairs shall meet the requirements of the Rules for INS Construction in force.

1.3 Information on the scope of periodical surveys and intervals between them shall be found in Table 1.3 being the summarized list of items of technical supervision. In case the disputes regarding the determination of scope and schedule of surveys arise, the final decision shall be made on the basis of the requirements set forth in the relevant sections of the Rules for INS Surveys.

Table 1.3

Table of the INS periodical surveys

Symbols:

O – examination with access, opening-up or dismantling of individual items, where necessary;

C – external examination;

M – measurements of wears, clearances, insulation resistance, etc.;

H – pressure tests (hydraulic, pneumatic);

P – operational testing of machinery, equipment and arrangements, external examination included;

E – control of the availability of valid documents and/or stamps testifying to the instrumentation being checked and calibrated by relevant competent authorities, if subject thereto.

Nos.	Item to be surveyed	Periodical surveys			
		Intermediate survey for class confirmation (refer to 3.2.2)	1st special	2nd special	3rd special
1	Hull				
1.1	Underwater hull (external examination) ¹				
1.1.1	Keel, stem, stern frame, propeller shaft struts and rudder brackets	C	O	O	O
1.1.2	Shell plating	C	O	OM ²	OM ²
1.1.3	Sea chests, welded-on branches under sea chests	C	O	OM ³	OM ³
1.2	Above-water hull (external examination)				
1.2.1	Stern, stern frame	C	O	O	O
1.2.2	Shell plating	C	O	OM ²	OM ²
1.2.3	Upper deck plating	C	O	OM ²	OM ²
1.2.4	Superstructures and deckhouses, machinery casings (deck plating, bulkheads), hatch and ventilator coamings	C	O	O	O
1.2.5	Seatings of deck machinery	C	O	O	O
1.2.6	Bulwark and hand rails	C	O	O	O
1.3	Inner compartments ⁴	C	C	C	C
1.3.1	Forward and aft ends		O	O	O
1.3.2	Tanks being an integral part of the hull (including double bottom tanks) together with air and sounding pipes:				
	.1 fresh water tanks, ballast tanks and drain tanks		O	OH ⁵	OH ⁵
	.2 fuel oil and lubricating oil tanks		OH ⁶	OH ⁶	OH ⁶
1.3.3	Cargo holds:				
	.1 for dry cargoes	C	O	O	O
	.2 cargo tanks together with air and sounding pipes		OH	OH	OH
1.3.4	Machinery spaces:				
	.1 main and auxiliary machinery spaces, boiler rooms, trunks to those spaces	C	O	O	O
	.2 seatings of main and auxiliary machinery and boilers		O	O	O

Table 1.3 — continued

Nos.	Item to be surveyed	Periodical surveys			
		Intermediate survey for class confirmation (refer to 3.2.2)	1st special	2nd special	3rd special
1.3.5	Other spaces in hull and superstructures		O	O	O
1.3.6	Load line	C	C	C	C
2	Arrangements, equipment and outfit				
2.1	Hatch covers and manhole closures, outside doors, side scuttles, doors in watertight bulkheads	C	OH ⁷	OH ⁷	OH ⁷
2.2	Steering gear				
2.2.1	Rudder blade, steering nozzle, rudder tube	C	O ⁸	O ⁸	O ⁸
2.2.2	Rudder stock, pintles, bearings, couplings	CM ⁹	OM ⁹	OM ⁹	OM ⁹
2.2.3	Main and auxiliary steering gears together with control system and stations, rudder angle indicators, rudder stop	P	O	O	O
2.3	Anchor arrangement	P	P	P	P
2.3.1	Anchor and hawse pipes	C	O	O	O
2.3.2	Chain cables and wire ropes	C	OM	OM	OM
2.3.3	Stoppers and chain cable releasing devices	P	OP	OP	OP
2.4	Mooring arrangement		O	O	O
2.5	Towing and pushing arrangements:				
	.1 hook with fastening and equipment	O	OP	OP	OP
	.2 hoop ¹⁰		O	O	O
	.3 bollards and ropes	C	O	O	O
	.4 pushing bitts		O	O	O
	.5 coupling device	C	O	O	O
3	Fire protection				
3.1	Structural fire protection				
3.1.1	Fire-resisting and fire-retarding divisions and closures of openings therein	C	C	C	C
3.1.2	Closures of outer openings (vent ducts, skylights of engine and boiler rooms etc.)	P	P	P	P
3.2	Fire extinguishing systems				
3.2.1	Water fire main system, water-screen system, drenching system, pressure water-spraying system, foam fire extinguishing system ¹⁴ , sprinkler system	OPH	P	OPH	OP
3.2.2	Carbon dioxide smothering system, inert gases extinction system	PEH	PE	OPEH ⁴⁹	PE
3.3	Fire detection and alarm system ⁵⁰	P	P	P	P
3.4	Fire-fighting outfit ¹⁵	PE	PE	PE	PE
3.5	Liquefied gas installations for domestic purposes ¹⁶	E	EH	EH	EH
3.6	Instrumentation	E	E	E	E
4	Machinery installations				
4.1	Main internal combustion engine ¹⁷	P	P	P	P
4.1.1	Frame:				
	.1 bed plate, crankcase, columns, blocks, tie rods, cylinder covers, cylinder cover pins		O	O	O
	.2 cylinder liners ¹⁸		OM	OM	OM
4.1.2	Piston assembly:				
	.1 pistons, gudgeon pins, connecting rods		OM	OM	OM
	.2 top-end and bottom-end bearings and their bolts ¹⁹		OM ²⁰	OM ²⁰	OM ²⁰
4.1.3	Crankshaft:				
	.1 journals and crank pins		OM	OM	OM
	.2 main bearings and their studs		O	O	O
	.3 crank web deflection		M	M	M
	.4 crankshaft sag (for engines which crankshafts placed on bushes filled up with babbit)	M	M	M	M
4.1.4	Distributing devices (valve drives, suction, exhaust and starting air valves)		O	O	O
4.1.5	Safety valves (of cylinder covers, fuel oil pumps, crankcase hatches)		p ²¹	p ²¹	p ²¹
4.1.6	Lubricating devices (lubricators, etc.)		P	P	P
4.1.7	Gear and disengaging couplings:				
	.1 casings, reamed bolts and chocks		O	O	O
	.2 shafts and bearings		OM	OM	OM
	.3 pinions and gear wheels (gearing contact)		OM	OM	OM
	.4 engagement parts		M	M	M
	.5 shaft positions – journal and thrust bearings clearances		M	M	M

Table 1.3 — continued

Nos.	Item to be surveyed	Periodical surveys			
		Intermediate survey for class confirmation (refer to 3.2.2)	1st special	2nd special	3rd special
4.1.8	Manoeuvring and starting devices, remote control arrangements	P	OP	OP	OP
4.1.9	Speed governor and overspeed device	p ²²	p ²²	p ²²	p ²²
4.1.10	Auxiliary machinery driven by main engine ²³ :				
	.1 cooling water, lubricating oil, bilge and fuel oil booster pump		OP	OP	OP
	.2 compressors:				
	.2.1 compressor air coolers		OP	OP	OPH ²⁴
	.2.2 safety valves		P	P	P
	.2.3 purging pumps, turboblowers		OP	OP	OP
4.1.11	Shaft-turning gear		OP	OP	OP
4.1.12	Torsional vibration damper, antivibrator	C	OM	OM	OM
4.2	Auxiliary internal combustion engine:	P	P	P	P
	.1 cylinders, pistons with connecting rods and their bearings, crankshafts and main bearings, covers and valves	P	OM	OM	OM
	.2 speed governor and overspeed device		P	P	P
4.3	Instrumentation	E	E	E	E
4.4	Shafting and propeller ²³				
4.4.1	Thrust shaft:				
	.1 journals, thrust collars and flanged joints		OM	OM	OM
	.2 journals and thrust bearings		O	O	O
	.3 reamed bolts and chocks of thrust bearing		O	O	O
	.4 axial clearance ²⁵	M	M	M	M
	.5 shaft alignment ²⁶	M	M	M	M
4.4.2	Intermediate shafts:				
	.1 journals, journal bearings, flanged and coupling joints		OM	OM	OM
	.2 reamed bolts and chocks of bearings		O	O	O
	.3 shaft alignment ²⁶	M	M	M	M
4.4.3	Propeller shaft ²⁷ :	O ²⁸ p ²³	O ²⁸ p ²³	O ²⁸ p ²³	O ²⁸ p ²³
	.1 journals	M ²⁸	M ²⁸	M ²⁸	M ²⁸
	.2 propeller cone ²⁹	O	O	O	O
	.3 sterntube and bracket bearing clearances ³⁰	M	M	M	M
	.4 journal bearing	O ²⁸	O ²⁸	O ²⁸	O ²⁸
	.5 sterntube	O ³¹	O ³¹	O ³¹	O ³¹
	.6 propeller shaft seal ²⁴	OH	OH	OH	OH
	.7 flanged and coupling connections	O ²⁸	O	O	O
4.4.4	Propeller ³² :		OH	OH	OH
	.1 static balancing ³³				
	.2 propeller shaft fitting (adjusting ³⁴)				
	.3 parts of controllable pitch propellers (CPP), vertical axis propellers and steerable propellers				
	.4 propeller securing (locking) ²⁸				
4.4.5	CPP control systems	P	OPH	OPH	OPH
4.5	Auxiliary machinery				
4.5.1	Pumps (circulating, boiler, bilge, cooling water, feed, ballast, fire, fuel oil, lubricating oil pumps), generators and pumps of hydraulic drive system	P	OMP	OMP	OMP
4.5.2	Centrifugal fuel oil and lubricating oil separators ³⁵	P	OP	OP	OP
4.5.3	Compressors:	P	P	P	P
	.1 cylinders, crankshaft and main bearings, cylinder covers and valves		OM	OM	OMH ²⁴
	.2 air coolers				
	.3 safety valves	P	P	P	P
4.5.4	Fans of dangerous spaces	P	OP	OP	OP
4.5.5	Steering gear	P	OMP	OMP	OMP
4.5.6	Anchor machinery	P	OMP	OMP	OMP
4.5.7	Mooring machinery	C	P	P	P
4.5.8	Boat winches	P	OMP	OMP	OMP
4.5.9	Towing winch with arrangements (for tugs)		OMP	OMP	OMP
4.5.10	Machinery of coupling devices		OMP	OMP	OMP
4.5.11	Mechanical telegraphs	P	P	P	P
4.5.12	Instrumentation	E	E	E	E
5	Boilers, heat exchangers and pressure vessels				
5.1	Boilers:				
5.1.1	Smoke tube ^{36,37,38}	P	OMP	OMPH	OMP

Table 1.3 — continued

Nos.	Item to be surveyed	Periodical surveys			
		Intermediate survey for class confirmation (refer to 3.2.2)	1st special	2nd special	3rd special
5.1.2	Gas-tube ^{36,37,38}	P	OMP	OMPH	OMP
5.1.3	Water-tube ^{36,37,39}	P	OP	OPH	OP
5.1.4	Waste-heat ^{36,37}	P	OP	OPH	OP
5.1.5	Organic coolant		OPH	OPH	OPH
5.1.6	Boiler fittings	P	OP	OHP	OP
5.1.7	Safety valves	P	OP	OHP	OP
5.1.8	Instrumentation	E	E	E	E
5.2	Heat exchangers and pressure vessels				
5.2.1	Heat exchangers and their fittings:	P	OPH ⁴⁰	OHP	OPH ⁴⁰
	.1 safety valves	P	P	P	
5.2.2	Air receivers and other pressure vessels and their fittings:	P	OPH ⁴⁰	OHP	OPH ⁴⁰
	.1 safety valves	P	P	P	P
5.2.3	Instrumentation	E	E	E	E
6	Automation^{41,42,43}				
6.1	Systems (together with alarm system and protection systems)				
6.1.1	Centralized automatic control of machinery installations	P	OP	OP	OP
6.1.2	Remote automated control, remote control of main engines and CPP	P	OMP	OMP	OMP
6.1.3	Automatic and automated control of electric generating plant	P	OMP	OMP	OMP
6.1.4	Automatic control of steam boilers	P	OMP	OMP	OMP
6.1.5	Systems of control of lubricating oil temperature, cooling medium and fuel oil (fuel oil viscosity), as well as automatic filter cleaning	P	OMP	OMP	OMP
6.1.6	Compressor automation	P	OMP	OMP	OMP
6.1.7	Automation of fuel oil and lubricating oil separators	P	OMP	OMP	OMP
6.1.8	Automated control of valves and devices in the ship service systems	P	OMP	OMP	OMP
7	Systems and piping				
7.1	Bottom and side valves, as well as valves on watertight bulkheads				
7.1.1	Valves located below waterline ⁴⁴	OP	OP	OHP	OHP
7.1.2	Valves located above waterline	P	OP	OHP	OHP
7.1.3	Remote-controlled valves	P	PO	PO	PO
7.1.4	Flame arresters and flame-restricting valves on vent pipes	C	O	O	O
7.1.5	High-velocity devices of vent pipes in oil tankers, combination carriers and other ships	C	O	O	O
7.1.6	Welded branches for bottom and side valves	O	OM	OHM	OHM
7.2	Systems and piping				
7.2.1	Water systems:				
	.1 bilge, ballast, cooling and feed water	P	OP	OP	OPM
	.2 pipes passing through fuel oil tanks and liquid cargo tanks without pipe ducts ⁴⁵		OH	OH	OH
	.3 scuppers passing through sides, decks and bulkheads		O	O	O
7.2.2	Liquid and gas fuel system:				
	.1 gas fuel pipes	P	OP	OP	OP
	.2 automatic- and remote-controlled valves	P	OPH	OPH	OPH
	.3 liquid fuel pipes, remote-controlled valves	P	OP	OP	OP
	.4 independent fuel oil tanks	C	O	OH ⁴⁶	OP
7.2.3	Liquid cargo system of oil tankers ⁴⁷	C	O	O	O
7.2.4	Compressed air system	P	OP	OPH	OP
7.2.5	Lubricating oil system:				
	.1 pipelines	P	OP	OP	OP
	.2 independent tanks	C	O	OH ⁴⁶	OP
7.2.6	Steam systems:				
	.1 boiler pressure live steam and boiler blow-off	P	OP		OP
	.2 reduced pressure live steam		OP	OP	OP
7.2.7	Air, gas vent, overflow and sounding pipes	C	O	O	O
7.2.8	Gas vent systems of oil tankers	C	OP	OP	OP
7.2.9	Ventilation systems:				
	.1 vent ducts passing through watertight and fire-proof divisions	P	OP ⁴⁸	O ⁴⁸ P	O ⁴⁸ P
	.2 ventilation system of dangerous spaces	P	O ⁴⁸ P	O ⁴⁸ P	O ⁴⁸ P
	.3 exhaust ventilation system of gas fuel pipe ducts	P	OP	OP	OP
7.2.10	Hydraulic drive system	P	OP	OP	OP
7.2.11	Instrumentation	E	E	E	E

Table 1.3 — continued

Nos.	Item to be surveyed	Periodical surveys			
		Intermediate survey for class confirmation (refer to 3.2.2)	1st special	2nd special	3rd special
8	Electrical equipment				
8.1	Power and lighting equipment ⁵¹				
8.1.1	Electric propulsion plants:				
	.1 main generators, exciters, electric propulsion motors and electromagnetic clutches	P	OMP	OMP	OMP
	.2 switchboards	OP	OEMP	OEMP	OEMP
	.3 desks and panels for control and monitoring	P	OEMP	OEMP	OEMP
8.1.2	Electrical power sources for the ship's mains (main and emergency)	P	OMP	OMP	OMP
8.1.3	Converting devices feeding essential consumers	P	OMP	OMP	OMP
8.1.4	Switchboards:				
	.1 main and emergency switchboards	OP	OEMP	OEMP	OEMP
	.2 navigation light switchboards	OP	OEMP	OEMP	OEMP
	.3 section and group distribution switchboard	O	OMP	OMP	OMP
8.1.5	Cabling:				
	.1 cables and wires	M	OM	OM	OM
	.2 cable protection (additional), passage of cables through watertight and fire-proof bulkheads and decks		O	O	O
8.1.6	Electric drives of essential arrangements and machinery, as well as their control, starting and monitoring devices:				
	.1 pumps referred to in 4.5.1, compressors, anchor arrangements	P	OMP	OMP	OMP
	.2 steering gear	OP	OMP	OMP	OMP
	.3 mooring machinery		OP	OP	OP
	.4 towing winch		OP	OP	OP
8.1.7	Lighting:				
	.1 compartments and spaces important for safety and propulsion and habitability of people on board the ship	P	OP	OP	OP
	.2 other spaces		OP	OP	OP
	.3 navigation lights and emergency lighting	OP	OP	OP	OP
8.1.8	Electrical heating appliances for machinery installations and other electrical cooking and heating appliances	P	P	P	P
8.1.9	Electrical cables and electrical equipment in dangerous zones	OM	OM	OM	OM
8.2	Signalling devices and intercommunication system protection				
8.2.1	Electric engine telegraphs, essential electrical signalling systems, service telephone communication	P	OP	OP	OP
8.2.2	Ventilation of spaces for storage of carbon dioxide cylinders, of spaces protected by means of carbon dioxide smothering systems and of accumulator battery rooms	P	OP	OP	OP
8.2.3	Lightning protection devices, earthing	C	O	O	O
9	Radio equipment				
9.1	Spaces where shipboard radio communication facilities are installed	C	C	C	C
9.2	VHF radio installation	P	OMP	OMP	OMP
9.3	Two-way VHF radiotelephone apparatus	P	OMP	OMP	OMP
9.4	Portable VHF radiotelephone station intended for interior communication	P	OMP	OMP	OMP
9.5	Public address device	P	OMP	OMP	OMP
9.6	Radar transponder	EP	EP	EP	EP
9.7	Sources of power:				
	.1 converters	P	OMP	OMP	OMP
	.2 accumulator batteries	P	OMP	OMP	OMP
	.3 charging devices	P	OMP	OMP	OMP
	.4 cabling	P	OMP	OMP	OMP
	.5 switchboards	P	OMP	OMP	OMP
	.6 protective equipment against radio interference	P	OMP	OMP	OMP
9.8	Aerials	MP	OMP	OMP	OMP
9.9	Lead-in and interior wiring of aerials	C	O	O	O
9.10	Earthing	C	OM	OM	OM
10	Life-saving appliances				
10.1	Launching appliances ¹¹	P	OP	OP	OP
10.2	Lifeboats ¹¹	P	OP	OP	OP
10.3	Rigid liferafts and buoyant apparatuses ¹¹	O	O	O	O
10.4	Inflatable liferafts and lifejackets ¹²	CE	CE	CE	CE
10.5	Lifebuoys and lifejackets	C ¹²	C ^{12,13}	CE ^{12,13}	CE ^{12,13}

Table 1.3 — continued

Nos.	Item to be surveyed	Periodical surveys			
		Intermediate survey for class confirmation (refer to 3.2.2)	1st special	2nd special	3rd special
11	Navigational equipment				
11.1	Spaces intended for installation of navigational equipment	C	C	C	C
11.2	Compass	C	C	C	C
11.3	Radar	C	OP	OP	OP
11.4	Rate-of-turn indicator		OP	OP	OP
11.5	Echo sounder		OP	OP	OP
11.6	Sources of power:				
	.1 transducers	P	OMP	OMP	OMP
	.2 cabling	P	OMP	OMP	OMP
	.3 switchboards	P	OMP	OMP	OMP
11.7	Earthing	C	OM	OM	OM
11.8	Spare parts, portable instrumentation, measuring instruments and materials	C	CP	CP	CP
12	Signal means				
12.1	Navigation lights	P	P	P	P
12.2	Sound signal means	P	OP	OP	OP
13	Equipment and arrangements for the prevention of pollution by oil				
13.1	Tanks (segregated ballast tanks, cargo tank, slop tank, holding tank)		OMH	OMH	OMH
13.2	15 ppm bilge separator (if any)	P ⁵²	OMHP ⁵²	OMHP ⁵²	OMHP ⁵²
13.3	Safety valves	P	OP	OP	OP
13.4	15 ppm bilge alarm (if any)	MP	EMP	EMP	EMP
13.5	Pumping, piping and discharge arrangements	P	OHP	OHP	OHP
13.6	Instrumentation	E	E	E	E
14	Equipment and arrangements for the prevention of pollution by sewage				
14.1	Sewage treatment plant (if any)		OMHP ⁵³	OMHP ⁵³	OMHP ⁵³
14.2	Holding tank		OMH	OMH	OMH
14.3	Sewage collection, storage and discharge systems		OHP	OHP	OHP
14.4	Instrumentation		E	E	E
15	Equipment and arrangements for the prevention of pollution by garbage				
15.1	Incinerators (if any)	P	OMP	OMP	OMP
15.2	Garbage receptacles	C	C	C	C
15.3	Instrumentation	E	E	E	E

¹The following ships shall be submitted for survey of the underwater hull:
ships operated in ice, dynamically supported craft and air cushion vehicles — annually;
self-propelled ships — at each special survey and once within ± 9 months from the middle of the period between special surveys, except for the first period after completion of construction;

non-self-propelled oil tankers — at each special survey, starting from the second survey;

other non-self-propelled ships — at each special survey, starting from the third survey.

²M — residual thickness measurements, starting from the second special survey, of coamings, shell plating and upper deck plating in way of cargo tanks of oil tankers, as well as residual thickness measurements of shell plates, coamings, deck plating, platforms and inner bottom plating with framing having mastic coat, wooden planking, etc., for all ships and for the areas not indicated above starting from the third special survey shall be carried out at all special surveys in the scope specified by the surveyor depending on the technical condition of the item. Residual thickness measurements of welded-on branches shall be carried out starting from the second special survey, at each docking. Requirements for flaw detection of the hull and drawing up reports on thickness measurements are given in Appendix 3.

³M — residual thickness measurements, starting from the second special survey, in the scope specified by the surveyor depending on the technical condition of the item. Requirements for flaw detection of the hull and drawing up reports on thickness measurements are given in Appendix 3.

⁴Shell and deck plating, platforms and inner bottom plating; bottom, side and deck framing, pillars, watertight bulkheads and recesses, trunks and tunnels shall be surveyed from inside the spaces. Residual thickness of the above items shall be measured according to Note 2.

⁵Testing afloat may be allowed provided internal examinations are also carried out afloat.

⁶Fuel oil or lubricating oil testing may be performed afloat.

⁷Testing shall be carried out depending on the closure type.

⁸If substantial wear is shown by inspection results, the residual thickness of plates shall be measured.

⁹Measurements (clearances in bearings and rudder sag) shall be carried out at each dry docking survey of the ship.

¹⁰Only on tugs and push-tugs.

¹¹When assessing the technical condition as related to strength and/or tightness, the proof load testing of the launching appliances, lifeboats or checking of tightness of the boats and their air boxes or compartments of the rigid liferafts and buoyant apparatus may be required at the discretion of a surveyor.

Table 1.3 — continued

Such testing and checking are mandatory at special surveys of ships for lifeboats, rigid liferafts, buoyant apparatus and launching appliances 12 years of age and over.
¹² Documentation on periodical surveys and tests carried out at the survival craft station and proper marking of lifejackets and sealing of liferafts shall be verified.
¹³ Checking of maintaining dimensions, quality of the filler, testing for buoyancy and strength shall be carried out.
¹⁴ Availability of the necessary amount of fire extinguishing medium, branding of containers and cylinders by competent bodies, documents confirming suitability of fire extinguishing medium for application (for foam concentrate — in three years beginning from the date of manufacture and then annually) shall be checked.
¹⁵ Motor pumps and portable foam applicators shall be operationally tested. The availability of the document issued by a competent body confirming the specified characteristics of fire extinguishers, breathing apparatus, gas analyzers shall be checked. Fire extinguishers shall be surveyed at least once every two years.
¹⁶ Surveys and tests of liquefied gas installations for domestic purposes shall be carried out by the specialists authorized by the shipowner. Before putting the liquefied gas installations for domestic purposes in operation after each modernization or repair, and in case of each renewal of the certificate for liquefied gas installations for domestic purposes, these installations shall be approved by a survey commission or a specialist authorized by the shipowner. The certificate is valid not more than 3 years.
¹⁷ During special survey an operational testing shall be carried out during running trials. During survey for confirmation of class the readiness for use is checked, as well as the serviceability of manoeuvring and starting devices, remote control, machinery driven by the main engine and driving machinery; in this case, it is not necessary for the machinery to achieve a specific speed, load or other parameters.
¹⁸ Cylinder liners shall be checked magnetic particle or penetrant testing or by another approved method for detection of cracks in way of the upper landing shoulder and in the area of exhaust ports.
¹⁹ Connecting rod bolts of double-acting four- and two-stroke engines after 20000 h of operation, as well as in doubtful cases, shall be checked for fatigue cracks by magnetic particle testing or another approved method.
²⁰ During special survey, the length of connecting rod bearings bolts shall be measured.
²¹ Adjustment check shall be carried out.
²² Operational testing shall be carried out only for main machinery driving a propeller through a disengaging arrangement or CPP.
²³ Operational testing shall be carried out only during operational testing of the main machinery.
²⁴ H — every 12 years.
²⁵ M — once every two years.
²⁶ M — an axial clearance in the thrust bearing shall be checked at each intermediate survey with docking and at special survey.
²⁷ Intervals between overall surveys shall be 3 years for single-shaft ships and 4 years for multi-shaft ships. However, it may be extended to 5 years for structures approved by the Register (except for ships engaged in ice-breaking operations).
For oil-lubricated shafts, stern tube seals of which can be replaced by new ones without removal of the propeller, the modified survey may be carried out instead of overall survey during each second survey at six years (maximum) intervals provided the clearances in the aft bearing are in normal condition and oil seals proved to be effective.
On the shipowner's request, for oil-lubricated shafts to which the modified survey is applied, the interval between overall surveys may be extended, provided the partial survey is carried out; however, the interval shall not exceed 1,5 times the prescribed interval.
For oil-lubricated shafts to which the modified survey is applied, the interval between overall surveys may be extended to:
up to 9 years, provided the partial survey is carried out;
up to 12 years (in justified cases up to 15 years), provided the partial surveys is carried out and the system for monitoring shaft condition is implemented, which use is recorded in the Classification Certificate.
²⁸ External examination shall be carried out after removal of the propeller and extraction of the shaft from the stern tube.
²⁹ The propeller shaft cone for the propeller and half-coupling shall be checked for cracks by magnetic particle testing.
³⁰ Also at each docking.
³¹ O — also at each extraction of the shaft.
³² O — at survey of the propeller shaft; C — at each docking. Tightening and locking shall be checked during each dismantling. At each docking the propeller shall be checked for cracks by an approved method.
³³ M — at each propeller repair.
³⁴ O — at each dismantling.
³⁵ O — magnetic particle testing (for separators manufactured without the Register technical supervision — annually).
³⁶ O — interval between internal examinations before the second special survey shall be 3 years (+ 6 months); M — flame tubes only.
³⁷ H — boilers inaccessible for internal examination shall be hydraulically tested at each special survey of the ship.
³⁸ Incinerators shall be surveyed in accordance with Table 2.2.1, Part I "Regulations for Technical Supervision" of the Guidelines on the Application of Provisions of the International Convention MARPOL 73/78.
³⁹ Main water tube boilers where two or more of them are installed on board the ship shall be internally examined at each second annual survey.
⁴⁰ H — only for heat exchangers and pressure vessels inaccessible for internal examination and pressure vessels filled with exhaust gas.
⁴¹ Survey may be carried out within the scope of the special programme intended for the particular ship's design and approved by the Register.
⁴² The automation equipment listed is subject to survey if it is used to improve reliability in connection with specific features of particular ship's design (e.g., regulation systems, alarm and protection of steam water-tube boilers, high-speed engines that can be remotely-operated only, remote control of ballast, cargo and other systems where their valves are installed in tunnels, etc.).
⁴³ Special and annual surveys of automation equipment shall be carried out simultaneously with survey of machinery within the time periods specified in the Table.
⁴⁴ H — at each special survey starting from the second one; O — at each docking with sea valves and shut-off valves being dismantled.
⁴⁵ H — in 2 years in case the pipes have detachable joints inside the tanks.
⁴⁶ H — in 12 years.
⁴⁷ Prior to survey the cargo systems shall be degassed. Where necessary, pipe thickness shall be measured and pipes shall be hydraulically tested at the surveyor's discretion.
⁴⁸ For oil tankers, oil recovery ships, combination carries, gas carriers and chemical tankers only.
⁴⁹ At least 10 % of high-pressure carbon dioxide cylinders shall be hydraulically tested.
⁵⁰ Availability of the document issued by the competent body confirming regulated data performances of fire alarm indicators, or the ship's report on their check by means of special arrangements shall be verified. Warning alarm of carbon dioxide smothering system shall be tested at least once every 2 years.

Table 1.3 — continued

<p>⁵¹Insulation resistance of the ship's mains, electrical machinery and essential services shall be measured during survey for confirmation of class. At special surveys insulation resistance of all the ship's mains and fixed electrical machinery and services shall be measured.</p> <p>⁵²During intermediate surveys of ships flying the RF flag the results of sample analyses carried out by a recognized laboratory shall be submitted. During initial and special surveys samples are taken in the presence of the surveyor to the Register upon which the results of the sample analyses carried out by a recognized laboratory shall be submitted.</p> <p>⁵³During initial and special surveys of ships flying the RF flag the state sanitary authorities conclusion shall be submitted to confirm the compliance of the plants with the sanitary norms and requirements.</p>

The extent of particular examinations, measurements, testing, etc. is the minimum and may be changed by the surveyor to the Register proceeding from valid instructions and current situations.

1.4 Among the shipowner's responsibilities is keeping to the dates for periodical and other surveys, as prescribed by the Register, relevant preparation of ships for surveys, as well as notifying the Register of any deficiencies, damages, emergency occurrences or repairs of items subject to the Register technical supervision that have taken place during the period between the surveys.

1.5 The deviation from the requirements of the Rules for INS Construction may be possible in those cases where such deviation is allowed by these Rules, as well as under special circumstances and if there is sufficient justification, if necessary, with application of service restrictions. When making decision on the expediency of engineering solution related to repair or technical operation of ships using methods which deviate from those that are stipulated by the Rules for INS Construction, the possibility of such deviations is subject to special consideration by the RS Branch Office in each particular case.

1.6 At all types of surveys the surveyor is authorized to settle the problems within the limits regulated by the Rules for INS Surveys. Any amendments to, or deviations from, the requirements of the rules in force, as applied to a given ship, shall be approved by the RS Branch Office, which is confirmed by a report or another document signed by the head of the RS Branch Office or by his written message.

1.7 If a critical non-compliance with the requirements of the Rules for INS Surveys in respect of the ship's hull, arrangements, equipment and outfit, machinery installations, classed refrigerating plant, electrical, radio and navigational equipment is found during the survey, as well as their technical condition is recognized failing to ensure safe navigation, the ship shall not be recognized fit for service, and the ship's class is suspended until the ship is brought into line with the requirements of the Rules for INS Surveys or until defects are eliminated. In necessary cases the Classification Certificate or other documents may be withdrawn from the ship. If detected damages, faults or deficiencies do not evidently affect the ship safety and their elimination is impossible or troublesome for the time being, then, upon the shipowner's request, performing of the requirements of the Rules for INS Surveys may be postponed until the soonest scheduled repair or for the agreed term.

1.8 If dangerous defects being the result of structural deficiencies (e.g., incorrect structure, insufficient strength, etc.) are detected during survey, the surveyor shall demand both to repair damages, and to eliminate structural deficiencies, which have caused these damages, and shall also inform the RS Branch Offices and, if needed, the RS Head Office.

1.9 The surveyor to the Register may take part in the activities of various technical commissions as an expert on behalf of the RS Branch Office concerned. The surveyor's report shall be approved by the RS Branch Office, and in exceptional cases, by the RS Head Office.

1.10 All the items of the Register technical supervision (machinery, boilers, pressure vessels and other equipment and outfit) on board the ship shall be provided with the relevant Register documents stipulated by the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships, or with manufacturer's documents, as well as appropriate operating manuals and repair documents for the products, when needed.

The surveyor shall demand the above documentation be submitted when new equipment is installed on board the ship, or new outfit is provided, and may demand this documentation during survey of a ship in service, as well as during repair of the items to be surveyed.

1.11 During all types of surveys the surveyor shall familiarize himself with the ship's List of Survey's Status, reports on the previous survey, as well as use information on wear, damages and defects revealed in operation, on repairs and replacements made and recorded in the ship's documentation (condition assessment records, ship reports, notes on drawings, repair sheets, ship and engine room log books).

1.12 The scope of survey carried out, the results of technical condition assessment, data on measurements and on the extent of repair and replacements made shall be adequately shown in the reports on survey to be taken into account during subsequent surveys. The text and sketches shall unambiguously describe the defects identified, causes of their occurrence and the requirements on their elimination.

2 FREEBOARD ASSIGNMENT AND CONTROL, STABILITY CHECKING AND CONTROL

2.1 The assignment of an allowable freeboard for the navigation area specified is determined during initial survey of a ship.

2.2 First of all, sufficient strength, as well as ship's stability and unsinkability for the area of navigation and operating conditions within the range of draughts corresponding to the minimum freeboard shall be confirmed when a freeboard is assigned.

Strength, stability and unsinkability shall be deemed sufficient if relevant requirements of the Rules for INS Construction are met. At that, it is understood that the ship is constructed and maintained in compliance with the requirements of these Rules and norms, as well as that approved and sufficient information supplied to the master is carried on board at all times.

2.3 The freeboard shall be determined based upon calculation of the minimal freeboard in accordance with Part IV "Stability, Subdivision, Freeboard" of the Rules for INS Construction, as well as upon results of check (during survey of ship) for compliance with structural requirements of these Rules in respect of:

construction of superstructures and coamings;

cargo and other hatchways, machinery casings, boiler hatchways, manholes, scuttles, vent and air pipes located on open decks.

The correct marking of the deck line on ship's sides, as well as load line and lines to be used with this mark shall be checked during survey.

2.4 Information on freeboard from the as-built technical documentation shall be used for assignment of freeboard. Freeboard depth is specified in the Ship statement or in the Classification Certificate (form 3.1.3).

2.5 When assigning a freeboard, Stability Booklet, Damage Stability Booklet, Loading Manual stipulated by the Rules for INS Construction shall be carried on board at all times.

Informations, manuals schemes and drawings are subject to the RS approval and shall be carried on board at all times.

2.6 Where no alterations have been made to a ship which can affect the freeboard depth, stability, unsinkability and structural strength such information shall be taken into account during periodical surveys. Structures, valves and means for securing watertightness of openings in the shell plating and decks shall be externally examined to ensure their operable condition, the correct marking of the load line shall also be checked. If there are any doubts, the tests for tightness of openings in the shell plating and freeboard deck may be required.

2.7 Ship's stability ensured with regard to the ship's purpose and area of navigation shall be verified during initial survey based upon calculation results in accordance with the Rules for INS Construction.

2.8 Stability calculations shall be based on the experimental determination of the ship's displacement and centre of gravity position (inclining test). Upon agreement with the Register the inclining test may be omitted on ships for which it is proven by calculations that the ship has sufficient margin of stability.

2.9 During initial survey the structural features of the ship considered in stability calculations shall be subject to verification in respect of:

closing appliances of openings in open decks and ship sides;

special arrangements for moving the point of application of tow line tension on tugs;

solid ballast stowage (if any).

2.10 Ship's stability is confirmed by approval of the Stability Booklet for the master. This Booklet shall deal with all types of cargoes the ship is intended for.

2.11 During periodical surveys of ships, as well as during surveys related to repair and conversion, it shall be checked that the Stability Booklet is carried on board at all times, and that no alterations have been made to the ship which may affect the stability.

3 DETERMINATION OF PASSENGER CAPACITY

3.1 Passenger capacity for passenger ships (ships carrying more than 12 passengers) shall be determined during initial survey.

3.2 Cargo ships carrying 12 and less passengers do not require special calculation of passenger capacity, however accommodation spaces for passengers and life-saving appliances shall meet the requirements of the Rules for INS Construction considering passengers as members of the crew.

3.3 Information on design or rated passenger capacity according to as-built technical documentation shall be used for determination of passenger capacity.

3.4 The number of passengers shall comply with the passenger area (berths or seats) prescribed for them, and the number of steerage passengers — the deck areas suitable for their accommodation.

3.5 The number of passengers shall not exceed the number taken for the calculations of ship's stability and unsinkability and the allowable number of people based on the amount of available life-saving appliances.

3.6 When determining passenger capacity and during periodical surveys the following items shall be specially checked:

structural fire protection including fire-proof bulkheads and decks and closing appliances of openings in them;

fire doors and doors in watertight bulkheads, their drives and alarms;

closing appliances of openings in shell plating, decks, superstructures and bulkheads;

protection of crew and passengers;

fire extinguishing systems with associated machinery, valves and alarms serving them;

fire detection and alarm systems;

fire-fighting equipment and outfit, spare parts and instrument.

3.7 On the shipowners request it may be allowed to carry passengers on board the ship or their number may be increased after satisfactory results of verification during survey and relevant calculations specified in 3.2, 3.4, 3.5 и 3.6.

4 SHIP'S HULL SURVEY

4.1 GENERAL

4.1.1 This Section sets the requirements for hull survey of steel ships and floating structures which purpose, dimensions and design are covered by the scope of application of the Rules for INS Construction.

Hull survey of ships which purpose, dimensions and design differ from the scope of application of the Rules for INS Construction shall be carried out in compliance with the requirements established by the Register in each particular case.

4.1.2 During hull survey the applicable requirements of Part I "General Provisions" of the Rules for INS Surveys shall be met.

4.1.3 Hull surveys shall be carried out during initial and periodical surveys which scope is specified in the relevant sections of this Part, and during occasional surveys related to special circumstances. Survey of the hull in dry dock is an integral part of the special and intermediate surveys of self-propelled ships and special survey of non-self-propelled ships.

4.1.4 For hull structures newly installed on ships during modernization, as well as in case of their replacement during repair, the documents on materials and products according to the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships shall be submitted.

4.1.5 After repair of hull structures or installation of new structures on ships, the due tests shall be conducted as stipulated for their manufacture. These tests shall be conducted in compliance with the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships followed by issue of the relevant documents.

4.1.6 For the purpose of all types of surveys, the ship's hull shall be prepared accordingly, and access, opening-up and dismantling shall be ensured, where necessary.

4.1.6.1 During dry docking survey the ship shall be placed on cages or keel blocks of such a height that the ship's bottom can be thoroughly examined (minimum height of keel blocks shall be at least 1,2 m); sufficient lighting of bottom shall be provided for close-up survey of all hull components.

4.1.6.2 Ship spaces, compartments and tanks to be examined shall be free from cargoes, ship stores, shall be cleaned and ventilated, fuel and oil tanks shall be gas-freed.

4.1.6.3 Proper conditions, facilities and equipment shall be provided for safe execution of survey of cargo tanks of oil tankers. Tanks and spaces shall be degassed to the level not exceeding maximum permissible concentration of vapours of relevant products.

Cargo and ballast tanks shall be free from water, sediments, cleaned from dirt, oil residues, etc., and sufficient lighting shall be provided for thorough examination of structures.

4.1.6.4 In some cases opening-up of wooden or metal plating in holds, side and bulkhead linings in holds, as well as in accommodation and service spaces, removal of wooden deck planking, of insulation in accommodation and service spaces, as well as in refrigerated chambers, removal of cementation and other structures coatings may be required.

4.1.6.5 Where necessary, dismantling of some structures and equipment, which make access to the surveyed items difficult, as well as removal of solid ballast may be required.

4.1.6.6 Sufficient lighting of spaces and compartments shall be provided.

4.1.7 The summarized scope of surveys of hull structures during periodical surveys is given in Table 1.3.

The extent of separate examinations, measurements, tests specified in Table 1.3 shall be determined by the surveyor based on particular survey conditions having regard to the gradual expansion of survey scope as the ship grows older, as well as on repairs and replacements made.

In all cases the extent of examinations and measurements may be changed by the surveyor considering structure, service life, corrosion protection condition, results of the previous surveys.

4.1.8 Periodical surveys beginning from the date of the initial survey carried out by the Register after the ship construction to the RS class are given in Table 1.3. If a ship is constructed without technical supervision of the Register and had no RS class, the periodical surveys shall be carried out in accordance with Table 1.3 starting from the survey (subject to the age of ship) which was performed in the scope of the initial survey.

4.1.9 Thickness measurements shall be performed by service suppliers recognized by RS in compliance with the requirements of Section 9 of Part I "General Regulations for Technical Supervision" of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships considering Section 7, Part I "General Provisions" of the Rules for the Classification Surveys of Ships in Service in the presence of the RS surveyor. Thickness measurements may be also carried out by the RS surveyors provided they have appropriate qualification certificates.

4.1.10 Thickness measurements shall normally be carried out by means of ultrasonic test equipment. The accuracy of the equipment shall be proven to the surveyor as required.

One or more of the following fracture detection procedures may be required, if deemed necessary by the surveyor:

- radiographic testing (X-ray or gamma-ray testing);
- ultrasonic testing;
- magnetic particle testing;
- penetrant testing (dye penetrant testing);
- or other non-destructive testing methods.

Results of thickness measurements shall be indicated in the shell expansion drawings or drawn up as the tables signed and stamped by surveyor. Tables of all measurements shall be summarized in the official report and enclosed to the report on testing for defects of the ship's hull and be part of the ship documentation. Besides, results of thickness measurements shall be recorded by surveyor in the relevant reports on (dry docking and special) surveys.

4.2 INITIAL SURVEY

4.2.1 Initial survey in the scope of special one is carried out at assignment of class to ships in service which had no RS class.

During initial survey, the hull structures, materials and scantlings of members shall be checked for compliance with the requirements of the Rules for INS Construction, as well as longitudinal and local strength shall be checked to be ensured proceeding from the ship purpose and area of navigation. Checking shall be made for compliance with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service. The exception is checking of the compliance of the ship scantlings that shall meet the requirements of newly published Rules for INS Construction. During the survey, the technical condition of hull structures shall be checked in respect of welded and riveted joint quality, tightness, wear extent and damage presence, also hull technical condition shall be assessed.

Where considerable wear of hull is detected, the surveyor shall demand that testing of hull structures for defects be carried out for determining residual thickness of structures and comparing them with permissible wear rates.

Hull technical condition is assessed by comparing the actual scantlings with the permissible residual scantlings of hull members. Where necessary, a comparative analysis of hull section modulus, upper deck section modulus, as well as side shell and longitudinal bulkhead section moduli, may be required.

4.2.2 The scope of initial survey for reassignment of RS class to ships the RS class of which was withdrawn shall not be less than the scope which corresponds to that type of survey (intermediate, special, occasional) omission of which in due time caused suspension or withdrawal of class. Such initial surveys shall be credited from the date originally due and the annual anniversary date of the Classification certificate shall not be changed in this case. The ship is considered disclassified from the date of class suspension until the date of class reinstatement/reassignment. Subsequent surveys shall be carried out on the dates originally due. Where because of class withdrawal the scheduled next intermediate/special survey is overdue, the ship shall be submitted again to the initial survey within the scope of that overdue survey.

4.3 INTERMEDIATE SURVEY

4.3.1 The summarized scope of hull surveys during intermediate surveys is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

Schedule of dry docking surveys is given in 4.3, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions") the surveys shall be repeated.

4.3.2 Modifications in the ship hull structures and its technical condition against those determined during initial or special survey shall be revealed during intermediate survey of the ship.

4.3.3 During intermediate survey, the hull structures, above-water part of the hull, stems, stern and bow transoms, upper deck plating are subject to external examination. Overall survey of seatings of main, auxiliary and deck machinery, pump rooms of tankers, as well as overall survey of structures in ballast tanks where ballast water is typically held shall be carried out. Depending on ship's age, the cargo holds and tanks shall also be surveyed. Attention shall be paid to the condition of protective coatings of hull structures in cargo and ballast tanks of oil tankers, and to the absence of defects like deformations, cracks and excessive wear.

Where the technical condition of structures is questioned, the surveyor may demand partial opening-up of linings, planking and coatings of decks, bulkheads, ceilings to provide access to the items of close-up survey.

4.3.4 Depending on the ship's type and age, carrying out surveys of hull structures, it is recommended to use the inspection procedures specified in 4.6 for the hull members being subject to intensive wear due to the corrosive environment, sweating, insufficient ventilation and excessive humidity, and where technical maintenance during operation is impeded.

4.3.5 If the survey, not providing for the hull to be surveyed in dry dock, reveals defects that arise any doubt as to the condition of the outside of the ship's bottom, the surveyor may require that the ship shall be dry docked or the suspect area shall be submitted for in-water survey using underwater TV, or for diving inspection by specialists of a recognized organization.

4.4 SPECIAL SURVEY

4.4.1 The summarized scope of hull surveys during special surveys of ships is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

Schedule of surveys of the outside of the ship's bottom is given in 4.3, Part I "General Provisions".

4.4.2 During special survey of the ship, the hull structure shall be checked for compliance with the requirements of the Rules for INS Surveys and the hull technical condition shall be assessed in respect of tightness, wear extent and damage presence with assessing, where necessary, their effect upon overall longitudinal and local strength providing that:

.1 for ships made from steel, the minimum thickness t_{\min} is determined in accordance with the larger value of the following formulae:

.1.1 for ships that are longer than 40 m:

$$t_{\min} = fbc(2,3 + 0,04L), \text{ in mm};$$

for ships not more than 40 m in length:

$$t_{\min} = fbc(1,5 + 0,06L), \text{ in mm, however, not less than 3,00 mm};$$

.1.2 $t_{\min} = 0,005a\sqrt{T}$, in mm,

where

a = frame spacing, in mm;

f = frame spacing factor:

$f=1$ for $a \leq 500$ mm;

$f=1 + 0,0013(a - 500)$ for $a > 500$ mm;

$f=1$ may be taken for the frame spacing when calculating the minimum thickness of the side plates. However, the minimum thickness of the bilge plates may in no case be less than that of the bottom plates and side plates;

b = factor for bottom, side or bilge plates:

$b = 1,0$ for bottom plates and side plates;

$b = 1,25$ for bilge plates;

c = factor for the type of structure:

$c = 0,95$ for ships with double bottom and wing void, where the partition between wing void and hold is located vertically in line with the coaming;

$c = 1,0$ for all other types of structure;

.2 in longitudinally framed ships with double bottom and wing voids, the minimum value calculated for the plate thickness in accordance with the formulae given in 4.4.2.1 may be reduced to a calculated value certified by the Register taking into account Appendix 3 for sufficient hull strength (longitudinal, transverse and local strength).

Plates shall be renewed if bottom, bilge or side plates are below the permissible value laid down in this way.

The minimum values calculated in accordance with the method are limit values taking account of normal, uniform wear, and provided that shipbuilding steel is used and that the internal structural components such as frames, frame floor, main longitudinal and transverse structural members are in a good state and that the hull shows no indication of any overloading of the longitudinal strength.

As soon as these values are no longer achieved, the plates in question shall be repaired or replaced. However, lesser thicknesses, of not more than 10 % reduction from calculated values, are acceptable locally for small areas.

.3 barges which are exclusively towed, the Register may allow minor deviations with respect to the minimum thickness of the shell plating of the hull. The deviation shall not be more than 10 %, and the minimum hull thickness shall not be less than 3 mm;

.4 for passenger ships to be surveyed under with the Danube Commission Recommendations 2014, the compliance with the requirements specified in 15-2.1 specified therein and taking into account, if necessary, provisions of Appendix 3 with regard to the application of 15-2.1 ii) of the Danube Commission Recommendations 2014 shall be verified during periodical surveys.

4.4.3 Measurements of residual thickness of coamings and shell plates and upper deck plating in way of cargo tanks of oil tankers shall be carried out starting from the second special survey.

4.4.4 Measurements of residual thickness of shell plates, coamings, deck plating, platforms and inner bottom plating with framing which have mastic coat, wooden planking shall be carried out for all the ships starting from the second special survey.

4.4.5 Measurements of residual thickness for the areas not indicated above shall be carried out at all special surveys of ships starting from the third one in the scope specified by surveyor depending on the technical condition of the item.

4.4.6 Survey of inner compartments, residual thickness measurements of shell plating, deck plating, platforms and inner bottom plating, bottom, side and deck framing, pillars, watertight bulkheads and recesses, trunks and tunnels shall be carried out within the time period specified in 4.4.4 to 4.4.5.

4.4.7 Tanks being part of the hull (including double bottom tanks) may be tested afloat provided they shall be examined from inside while the ship is also afloat. In this case, fuel oil and lubricating oil tanks may be tested with fuel oil or lubricating oil.

4.4.8 The summarized scope of survey of hull structures, residual thickness measurements and testing during special survey of a ship is given in Table 1.3. Table of hull tightness tests is given in Annex 10 to the Guidelines on Technical Supervision of Ships in Service.

4.4.9 During preparation for close-up survey of hull structures, the convenient and safe access to underdeck structures of the ship's hull in cargo holds shall be provided, the double bottom tanks shall be cleaned and dried.

4.4.10 Depending on the ship's type and age, carrying out surveys of hull structures, it is recommended to use inspection procedures specified in 4.6 for the hull members being subject to intensive wear due to corrosive environment, sweating, insufficient ventilation and excessive humidity, and where technical maintenance during operation is impeded.

4.4.11 Special attention shall be paid to the structure areas with the drastic change of the ship's hull and longitudinals cross-section where cracking is likely to occur.

At survey of bottom plating from the inside consideration shall be given to the bottom areas under sounding pipes, and also to the areas under suction branch pipes of bilge systems.

4.4.12 The upper edge of a sheer strake, the areas of its connection with a bulwark, the very bulwark shall be thoroughly examined to detect potential cracks.

The areas of potential cracks on the upper deck shall be thoroughly examined.

4.4.13 In testing hull structures for tightness, the following preparatory work shall be carried out: surfaces of the structures to be tested shall be thoroughly dried and cleaned, welds shall be slag free, fillets of the structures mated shall be dried. Devices and arrangements, which monitor a test pressure of water or compressed air shall be verified by competent bodies.

4.5 SURVEY OF THE OUTSIDE OF THE SHIP'S BOTTOM

4.5.1 Survey of the outside of the ship's bottom is carried out within the time period specified in 4.3, Part I "General Provisions".

4.5.2 Survey of the outside of the ship's bottom is carried out in order to periodically check the technical condition of the underwater hull, openings, bottom and side valves, external underwater parts of steering gear, propulsion plant and navigational equipment.

4.5.3 Generally, survey of the outside of the ship's bottom and related items shall be carried out in dry dock.

4.5.4 When survey of the outside of the ship's bottom and related items is carried out in dry dock or on a slipway, the ship shall be placed on blocks/cages of sufficient height and with the necessary staging to permit the examination of elements such as shell plating, including bottom and bow plating, stern frame and rudder, sea chests and valves, propeller, etc.

4.5.5 The side and bottom shell plating shall be examined for excessive corrosion or deterioration due to chafing or contact with the ground and for any undue unfairness or buckling. Stems, bar keel, bilge keels, propeller shaft struts, beams and floors of hopper dredgers and hopper barges, sea chests, as well as all welds. Special attention shall be paid to the connection between bilge strakes and bilge keels. Important plate unfairness and other deterioration, which do not require immediate repairs, shall be recorded.

4.5.6 Sea chests and their gratings, sea connections and overboard discharge valves, bottom and side valves, sea chest pipelines with filters, cocks and their fastenings to the hull or sea chests shall be examined. Valves and cocks may not be opened up more than once in a special survey period unless considered necessary by the surveyor.

4.5.7 Visible parts of rudder, rudder pintles and gudgeons, rudder shafts and couplings and stern frame shall be examined. If considered necessary by the surveyor, the rudder shall be lifted or the inspection plates removed for the examination of pintles. The clearances in the rudder bearings shall be ascertained and recorded. Where applicable, pressure test of the rudder may be required as deemed necessary by the surveyor.

4.5.8 Visible parts of propeller and stern bush shall be examined. The clearance in the stern bush and the efficiency of the oil gland, if fitted, shall be ascertained and recorded. For CPP, the surveyor shall be satisfied with the fastenings and tightness of propeller boss and blade sealing. Dismantling need not to be carried out unless considered necessary by the surveyor (survey of propeller shafts, sterntube arrangements and propulsion units).

4.5.9 Visible parts of side thrusters shall be examined.

4.5.10 For ships exceeding 20 years of age having no documents on renovation of their hulls, during dry docking survey it is necessary to carry out overall flaw detection of areas of the shell plating, which were on keel blocks during the last special survey in dry dock.

4.5.11 Residual thickness measurement of shell plating, sea valve recesses and branches of side valves shall be carried out during each special survey of the underwater hull starting from the second special survey.

4.5.12 Residual thickness measurement of welded branches shall be carried out during each dry docking survey starting from the second special survey.

4.5.13 Tanks being part of the hull (including double bottom tanks) and cargo tanks with air and sounding pipes shall be tested during each special survey of the ship's hull in dry dock.

4.5.14 The summarized scope of survey of hull structures, residual thickness measurements and testing during special survey of a ship is given in Table 1.3. Table of hull tightness tests is given in Annex 10 to the Guidelines on Technical Supervision of Ships in Service.

4.5.15 The in-water survey may be carried out in the following cases:

.1 in lieu of a dry docking surveys corresponding to intermediate surveys, provided the following conditions are met:

age of self-propelled ships shall not exceed 18 years;

propeller shaft and sterntube arrangement design shall permit operation of the shaft without its extraction during 6 years;

in absence of data on likely damages of the outside of the ship's bottom since the last dry docking survey, subject to mandatory elimination in the dock;

.2 for floating docks subject to technical supervision of the Register in lieu of a dry docking survey;

.3 for reinforced concrete and berth-connected ships in lieu of a dry docking survey;

.4 in lieu of a dry docking survey in making decisions on extension of special surveys;

.5 for passenger, wooden and composite ships, in lieu of a dry docking survey combined with intermediate surveys, subject to agreement with the Register and with conditions referred to in 4.5.15.1 being met, as well as on condition that coating of the outside of the ship's bottom is practically totally in place;

.6 in lieu of occasional a dry docking survey, subject to agreement with the Register, in connection with damages of the outside of the ship's bottom (in case of grounding, etc.).

For ships 18 years of age and over performance of in-water survey instead of survey of the outside of the ship's bottom in dry dock shall be considered by the Register in each particular case.

4.5.16 Procedures and requirements for conducting in-water survey are set forth in Section 9, Part II "Carrying Out Classification Surveys of Ships" of the Guidelines on Technical Supervision of Ships in Service and in the Annexes to these Guidelines.

4.6 RECOMMENDATIONS ON SURVEYS OF THE SHIP'S HULL¹

4.6.1. The recommendations on the examination of the shell plating, deck plating and closing appliances for openings:

.1 in the examination of the shell plating, particular emphasis shall be placed upon the condition of the upper edge of a sheer strake in way of butt welds, bulwark sections, mooring hawses, the change of a hull section, upon the welding-on of the side plating of superstructures, of transitional brackets, deck guard rails, upon the condition of the deck plating in way of the corners of cargo hatch cutouts, between the hatches where substantial corrosive wear is expected, in way of the welding-on of various means for cargoes securing;

.2 the inspection of worn hull members is first of all carried out in areas liable to intense wastage due to the corrosive environment, sweating, insufficient ventilation and excessive humidity, and where technical maintenance during operation is impeded (e.g. in dry spaces below an engine room, in bilge wells, on the plating under the suctions of systems, etc.).

The inspection shall be carried out in the following areas:

in holds and compartments wherein intensive wastage is likely to occur on the side of cargo spaces due to the kind of the cargo carried (coal, mineral fertilizers, various oil products, salt, chemicals, acids, fish in barrels, etc.), in double bottom compartments under boilers or in those alternatively used for liquid fuel oil and ballast, in ballast tanks, in pump rooms of oil tankers, in way of heating pipelines, in bilges, in compartments with cement and other coatings, in bilge wells, in segregated (clean) ballast tanks of oil tankers;

at hull members with increased wastage according to operational experience;

on surfaces where still water is likely to occur (e.g. on deck plating under the deck machinery at the fore end, in way of scuppers and vent duct coamings);

at hull members having small as-built thicknesses, especially at the fore and aft parts of a wind and water strake, on welded-on branch pipes of bottom and side valves, as well as on the plates of a reduced thickness allowed due to the presence of the approved means of corrosion protection;

at hull members with potential groove wear (in way of butts and seams of the shell plating at the outside of the ship's bottom, on the longitudinal and transverse bulkheads plating of oil tankers, in the weld zone of framing members welding to the shell plating at the underwater hull, as well as to the bulkheads plating of cargo/ballast tanks and to the bulkheads plating of other tanks);

in oil tanker's tanks on bottom plating in way of drain holes for a liquid cross-flow, where grooving is likely to occur, in cofferdams, drain tanks for oil residue and bilge water;

in sea chests and chain lockers;

in areas of linear wear (plates of an ice belt, a fore section of bottom plating, a wind and water strake, especially within the transition area between the fore-body entrance and parallel body, as well as at the aft part);

in areas of the intersection of longitudinal and transverse framing girders, mainly at the bottom, where spot wear may appear;

on the plating of lower sections of bulkheads and on the inner skin in way of the connection with tween decks, inner bottom plating;

within sections with pitting.

In an examination of framing members, special consideration shall be given to the locations of potential local wear, in particular, at the joints of framing members with knees and brackets, at the intersections of longitudinal and transverse framing members, and also at the locations of hull members deformation;

.3 the most likely areas where residual deformation may arise are the following:

deck and coaming of dry cargo ships in way of derricks, of ships carrying cargoes in bulk which are handled with grabs, and of timber carriers;

¹The recommendations given below may be used by the surveyors in conducting any types of surveys of hull structures depending on the ship's age and condition.

ship's side within the ice belt and in way of moorings;
fore and aft ends, and the superstructure side of the ships passing through locks, channels, narrow waters;

inner bottom of cargo holds of the ships carrying bulk cargoes with a small specific volume, and of timber carriers;

fore part of a ship's side which has a large flare and is subjected to slamming;

bottom and bilge of ships operating in shallow water, passing through rivers and channels, being moored for drying-out and examination at river offings at low tide;

fore part of the bottom subjected to ice and slamming impact;

bilge keel, bulwark and guard rails;

bulkheads and inner skin of the oil tankers of which the holds can be partially filled, of the ships carrying bulk cargoes with a small stowage factor of which the bulkheads are cleaned by impacting, of timber carriers;

sections of framing members close to supports (approximately within 1/10 of the span), as well as brackets;

members of side framing, mainly on ice ships and ships being moored in waterway;

areas where plates of transverse bulkheads are connected to a ship's side, in particular, on ice class ships and ships moored in waterway;

.4 the most likely areas of potential cracking are the following:

corners of openings in cargo hatches;

end bulkheads of superstructures and deckhouses;

coaming terminations;

transitional areas between a sheer strake and a superstructure;

knee joints of girders;

intersections of primary members and deep members;

holes for structures lightening;

fillet and butt welds of flat bars;

places exposed to intense vibration or impact load (running vibration and wave vibration, slamming, ice and mooring loads, hydrodynamic loads);

structures at the aft and fore ends, the side structures within an area of alternating waterlines, bottom grillages of tankers, longitudinal and transverse bulkheads, etc.;

bulkhead panels located at an ice belt;

shell plating, plating of longitudinal and transverse bulkheads in areas of groove wear (generally, in the underwater hull on the side opposite to framing welds);

structures of a stern frame and its joints with shell plating, an area of welded branches of side valves;

bilge keel, corners of sea chest cutouts;

intersections of bottom girders with floors, and of underdeck girders with web beams;

bottom plating at girders in way of drain holes for cargo overflow;

areas of potential cracking due to essential permanent buckling of plating and framing;

areas of terminations of intermediate frames for ice class ships with no additional strengthenings;

deck area in way of ends of brackets fitted in the plane longitudinal coamings.

On dry cargo and similar ships, cracks are most frequently observed in the following structures:

at joints of bulwark stanchions to deck;

at joints of hold frames to side stringers, and also in frame sections within a span and at frame supports, in particular, on ice class ships;

in forecastle structures (deck and side plating and framing).

On oil tankers and similar ships, cracks are most frequently observed in the following structures:

at joints of a vertical keel to transverse bulkheads;

at joints of side longitudinals to web frames, and also to transverse bulkheads;

at joints of floors in central tanks to longitudinal bulkheads (especially, to corrugated bulkheads);

at joints of longitudinal corrugated bulkheads to vertical webs, shelves: at the lower part of bulkheads and approximately at the middle of their height, as well as at welds connecting corrugations; in areas of welding of longitudinal bulkheads to the bottom;

at joints of a cross tie to a web frame;

in plating of the flat longitudinal bulkheads which separate ballast and cargo tanks (segregated ballast tanks, clean ballast tanks);

around the periphery of cutouts in deck plating in way of expanders, especially for scalloped framing.

On bulk carriers, oil-bulk-ore carriers and combination carriers cracks are most frequently observed in the following structures:

at joints of a lower stool to inner bottom plating and hopper tank sloping plating;

at joints of carlings to the plating of an upper stool;

in way of welding of hopper tank sloping plates to transverse bulkhead corrugations;

at the stool shelf plate where laminar cracking of metal is noted;

.5 to be examined are the closing appliances of openings and, as far as practicable, the sealing arrangements of equipment components penetrating watertight bulkheads.

4.6.2 The recommendations on the examination of the hull by hammering its components:

hammering of hull structures may be used in any types of surveys at the discretion of the surveyor. The hammer test for suspect areas does not substitute thickness measurements in special surveys, but it is only the method of survey which supplements those used by the surveyor to the Register and extends the surveyor capabilities.

5 SURVEY OF THE SHIP'S ARRANGEMENTS, EQUIPMENT AND OUTFIT

5.1 GENERAL

5.1.1 During survey of ship arrangements, equipment and outfit, the applicable requirements of Part I "General Provisions" shall be met.

5.1.2 This Section sets the requirements for ship arrangements, equipment and outfit regulated by the Rules for INS Construction.

The survey of ship's arrangements, equipment and outfit subject to the RS technical supervision, which design is not regulated by the Rules for INS Construction, shall be carried out in compliance with the requirements established by the Register in each particular case.

5.1.3 Ship arrangements, equipment and outfit shall be surveyed during initial, special and intermediate surveys of ship, and under special circumstances also during occasional surveys.

5.1.4 During special survey of the ship, those items may not be surveyed for the second time, which have been surveyed in the necessary scope within 6 months before the date of the survey concerned.

5.1.5 For ship's arrangements, equipment newly installed on board, and for outfit taken onboard, as well as in case of their replacement, the documents on products according to the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships shall be submitted.

5.1.6 After repair or installation of new items of ship arrangements and equipment on ships, the tests shall be conducted as stipulated for their manufacture and installation onboard. These tests shall be conducted in compliance with the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships followed by issue of the relevant documents.

5.1.7 During all types of surveys, the ship's arrangements, equipment and outfit shall be prepared for survey so that to provide access, opening-up and dismantling, where necessary.

For the purpose of survey and operational testing, the items shall be submitted in a fit/serviceable condition.

During the survey, on the surveyor's request, all required documents (drawings, descriptions, diagrams, files or passports) shall be submitted.

5.1.8 The extent of examinations and measurements prescribed by this Section and related openings-up, disassembling and dismantling, in each case, may be changed by the surveyor with due regard to the structure, service life, results of the previous surveys, repairs and replacements made, as well as results of the survey in accessible areas and operational testing.

5.1.9 Fulfillment of the requirements set forth in the Rules for INS Surveys and the proper technical condition of closing appliances of openings, rudder and steering gear, anchor, mooring and towing arrangements, equipment of bulk cargo holds, emergency outfit and cargo securing equipment shall be confirmed by the Classification Certificate.

5.2 OPENINGS IN HULL, SUPERSTRUCTURES AND DECKHOUSES AND THEIR CLOSING APPLIANCES

5.2.1 Initial survey.

5.2.1.1 During the initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), the compliance of closing appliances design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service, shall be verified; for this purpose the following shall be checked:

.1 compliance of design of closures and height of coamings proceeding from the arrangement and purpose of openings, with the requirements of the Rules for INS Construction;

.2 technical condition of the items to evaluate the quality of their manufacture and to detect any defects (wear, damage, failures) during the operational testing, to determine their readiness for use and serviceability;

.3 compliance with the requirements of Cargo Securing Manual.

5.2.1.2 Survey of closing appliances of openings in hull, superstructures and deckhouses during initial survey of the ship in service shall be carried out in the scope of special survey.

5.2.2 Intermediate survey.

5.2.2.1 The summarized scope of survey of closing appliances of openings in hull, superstructures and deckhouses during intermediate surveys of ships is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys are repeated.

5.2.2.2 During the intermediate surveys the closing appliances of hatches and manholes, their coamings, stiffening structures and packing facilities shall be examined on open deck areas and inside superstructures, which are not enclosed, as well as external doors of superstructures and deckhouses, companion hatches, skylights and ventilating trunks, bow, side and stern doors and scuttles, ventilator covers and watertight bulkhead doors.

5.2.2.3 Doors in watertight bulkheads and their drives with indicators, as well as hatch cover drives shall be operationally tested.

5.2.2.4 Machinery, systems and electrical equipment forming part of mechanical drives of hatch covers and bulkhead doors shall be surveyed in compliance with the requirements to be found in the relevant sections of this Part.

5.2.2.5 During examination of weather decks, ship side plating above waterline, hatch covers and coamings the confirmation shall be obtained that no unapproved changes have been made to the hatch covers, hatches coamings and their securing and sealing devices since the last survey.

5.2.2.6 Mechanically operated steel covers shall be checked, in particular:

.1 hatch covers, including close-up survey of plating;

.2 tightness devices of longitudinal, transverse and intermediate cross junctions (gaskets, gasket lips, compression bars, drainage channels);

.3 clamping devices, retaining bars, cleating;

.4 chain and rope pulleys;

.5 guides;

.6 guide rails and track wheels;

.7 stoppers, etc.;

.8 wires, chains, gypsies, tensioning devices;

.9 hydraulic system essential to closing and securing;

.10 safety locks and retaining devices.

5.2.2.7 Portable covers, wooden or steel pontoons shall be checked, where applicable, in particular:

.1 wooden covers and portable beams, carriers or sockets for the portable beam, and their securing devices;

.2 steel pontoons;

- .3 tarpaulins;
- .4 cleats, battens and wedges;
- .5 hatch securing bars and their securing devices;
- .6 loading pads/bars and side plate edge;
- .7 guide plates and chocks;
- .8 compression bars, drainage channels and drain pipes.

5.2.2.8 The condition of hatch coaming plating and their stiffeners shall be checked.

5.2.2.9 Random checking of the satisfactory operation of mechanically operated hatch covers shall be made, including:

- .1 stowage and securing in open condition;
- .2 proper fit and efficiency of sealing in closed condition;
- .3 operational testing of hydraulic and power components, wires, chains and link drives.

5.2.2.10 Weld connections between all air pipes and deck plating shall be examined.

5.2.2.11 All air pipes installed on the exposed decks shall be examined externally.

5.2.2.12 Flame screens on vents to all fuel oil and lube oil tanks shall be examined.

5.2.2.13 Ventilator heads, including automatic, located on open decks and their closures shall be externally examined and their marking ("open — closed") shall be checked.

5.2.2.14 During intermediate survey of cargo hold hatch covers emphasis shall be placed upon the technical condition of means ensuring the tightness of hatch covers (around the entire perimeter and between hatch covers panels), of their securing devices, chain or wire rigging including sheaves, and guide rails and wheels, warping drums of the deck machinery used to drive the hatch covers, locks, drainage system, hydraulic drives for hatch covers closing and cleating, stops preventing covers shifting.

Where portable beams, pontoon hatch covers, as well as wooden covers are fitted, attention shall be given to the technical condition of structures, sockets for portable beams and their securing, cover hoisting pads and their locations, guide plates and brackets, water drainage arrangements, hatch coamings and their supports, as well as to the functioning of mechanical components of covers.

5.2.2.15 Tightness tests for hatch covers may be required where the tightness is questioned.

5.2.2.16 Tightness tests shall be carried out with a water jet from a nozzle having an outlet diameter of at least 12 mm at a hose pressure equal to a head of at least 10 m high. Hosing shall be carried out from a distance of not more than 3 m with the jet perpendicular to the surface tested. Other testing methods approved by the Register may be used.

5.2.2.17 Tightness tests for cargo hold hatch covers for ships aged over 20 years shall be conducted at each intermediate survey.

5.2.3 Special survey.

5.2.3.1 The summarized scope of survey of closing appliances of openings in hull, superstructures and deckhouses during special surveys of ships is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys are repeated.

5.2.3.2 During survey to be examined and checked (tested proceeding from the type) for tightness are: hatch and manhole covers on the open area of freeboard deck and enclosed superstructures, as well as inside superstructures, which are not enclosed;

closures of bow, side and aft openings in hull;

companion hatches, skylights and ventilating trunks;

scuttles;

covers of vent pipe coamings on freeboard and superstructure decks and deckhouses.

Hatch covers in tweendeck spaces shall be examined.

5.2.3.3 Hatch covers and coamings shall be surveyed as follows:

.1 thorough inspection of the items listed in 5.2.2.6 and 5.2.2.7, including close-up survey of hatch cover plating and hatch coaming plating, shall be carried out;

.2 checking of the satisfactory operation of all mechanically-operated hatch covers shall be made, including:

- stowage and securing in open condition;
- proper fit and efficiency of sealing in closed condition;
- operational testing of hydraulic and power components, wires, chains and link drives;

.3 checking of the effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent shall be carried out (refer to 5.2.2.16).

5.2.3.4 Watertight bulkhead and side port doors, bow and stern visor doors for loading vehicles are subject to thorough examination, and their drives with indicators, as well as hatch cover drives, shall be operationally tested.

5.2.3.5 Metal hatch covers on the freeboard and superstructure decks, doors of bow, side and after openings in hull exposed to sea shall be tightness tested together with their sealing and securing devices by hose testing (refer to 5.2.2.16).

5.2.3.6 During survey, the thorough examination of scuppers, bottom, side and watertight bulkhead valves shall be carried out. The bottom, side and watertight bulkhead valves located below the waterline shall be tested by hydraulic pressure during the ship docking.

5.2.3.7 When assessing the technical condition of metal closures, one shall be guided by the wear standards for hull structures.

The application of damaged or rotten wooden hatch covers is not permitted, as well as of hatch tarpaulins where damaged or rotten.

5.2.3.8 The application of metal hatch covers, doors of bow, side and after openings in hull, bow and stern visor doors for loading vehicles, which tightness is ensured by means of rubber or other sealing and securing devices, scuttles, watertight doors in superstructures, deckhouses, engine room trunks and bulkheads is not permitted in case of incomplete tightness, defects of sealing, closing devices and distortion of closures.

5.2.3.9 During survey of outer closures for the openings intended for vehicles loading and unloading (ramps) emphasis shall be placed upon:

- the condition of bearing parts of metal ramp structures (presence of plastic deformations, cracks, welds condition);

- the condition of cargo ropes and blocks of which technical condition shall be assessed with use of the wear standards specified in 10.6 of the Rules for the Cargo Handling Gear of Sea-Going Ships;

- the operation of ramp drives;

- the operation of end switches limiting ramp position, the condition of stops fixing the ramp in sailing position;

- the condition of rubber seals and the access opening coamings, of cleating arrangements.

Recommendations on testing the closures for tightness are given in 5.2.2.16.

5.3 RUDDER AND STEERING GEAR

5.3.1 Initial survey.

5.3.1.1 During the initial survey of a ship in service (refer to 3.2, Part I "General Provisions") the compliance of the rudder and steering gear design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering ships in service, for this purpose the following shall be checked:

.1 compliance of the steering gear design and the specified time for putting the rudder over and the rudder angle being ensured with the requirements of the Rules for INS Construction;

.2 technical condition of the rudder and steering gear to evaluate the quality of their manufacture and to detect any defects (wear, damage, failures) during the operational testing, to determine their readiness for use and serviceability.

5.3.1.2 Survey of the rudder and steering gear during initial survey of the ship in service shall be carried out in the scope of special survey.

5.3.2 Intermediate survey.

5.3.2.1 The summarized scope of survey of the rudder and steering gear during intermediate surveys of ships is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

5.3.2.2 Rudder and steering gear examination includes an operational testing of the main and auxiliary steering gear together with the control system and stations, as well as with rudder indicators, underway or when lying.

5.3.2.3 Emergency steering gear and rudder stops are examined and operationally tested.

5.3.2.4 Machinery, systems and electrical equipment forming part of rudder and steering gear are surveyed in compliance with the requirements to be found in the relevant sections of this Part.

5.3.2.5 When assessing the technical condition of rudder and steering gear, the wear and defect rates given in 5.3.3.9 shall be considered.

5.3.3 Special survey.

5.3.3.1 The summarized scope of surveys of rudder and steering gear during survey of the ship is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2 Part I "General Provisions"), the surveys shall be repeated.

5.3.3.2 During survey, rudder blade, steering and fixed nozzles of propellers, rudder and steering nozzle stocks, rudder axle, rudder pintles and bearings, rudder tube and steering gear are subject to a thorough examination in dry dock with measurements of bearing clearances and dropping of the rudder and steering nozzle. During this survey, the security of component locking (nuts, pintles, liners, coupling bolts, etc.) shall be checked.

5.3.3.3 Where upon results of the rudder blade, steering nozzles and rudder tube examination a significant wear is detected, the residual thickness measurements of plates shall be carried out.

5.3.3.4 Measurements of bearing clearances and dropping of the rudder are carried out during each dry docking survey of the ship.

5.3.3.5 Machinery, systems and electrical equipment forming part of the rudder and steering gear are surveyed in compliance with the requirements set forth in the relevant sections of this Part.

5.3.3.6 The survey of the rudder stock, rudder blade, rudder and steering gear bearings and joints without dismantling may be allowed provided that the rudder and steering gear design permitting for bearing clearance measurements and bearing examination. In this case, partial dismantling may be necessary (removal of covers, small hatches, etc.), as well as other additional operations if doubts arise as a result of the survey, concerning the unit condition assessment. The surveyor reserves the right to require units to be opened up, rudder blade to be pressurized, etc.

During special survey of the ship, the rudder and steering gear shall be operationally tested with the main and auxiliary steering gear, and with the emergency steering gear are in operation.

Rudder stops and steering nozzle stops are subject to external examination.

5.3.3.7 The rudder and steering gear operated by the main steering gear shall be checked at full ahead speed and medium astern speed. The rudder and steering gear operated by the auxiliary steering gear shall be checked at ahead speed equal to half the ship maximum speed. During these tests the turning time and helm angles for rudder or steering nozzle, rudder stops shall be checked, as well as correct readings of the rudder or steering nozzle angle indicators and the absence of rudder or steering nozzle blade drift.

During all types of checking the rudder and steering gear underway, the rudder or steering nozzle shall be fully submerged.

5.3.3.8 When repairing or replacing the plating of profile rudders and steering nozzles, they shall be tested for tightness.

5.3.3.9 When assessing the technical condition of the rudder and steering gear during survey, the following shall be considered:

average wear of plating of the rudder blade, steering and fixed nozzles shall not exceed 1/4 of the as-built thickness;

stressed parts (including chains and steering-line rods) with the average wear 1/10 of the as-built thickness or diameter and above, as well as those having cracks or residual deformations are not permitted for application;

steel rope of the steering gear system shall be replaced if the number of broken wires is 1/10 of their total number or above at any point of its length equal to eight times the diameter, and if the rope is excessively deformed.

Reduction of the rudder stock, pintles diameter to values below those stipulated by the Rules for INS Construction is not permitted.

Permissible clearances for the supporting units of the rudder shall be in each case established considering their as-built thickness and joint design.

Where the rudder stock is twisted by 5° or more, its application may be only permitted subject to annealing and to sector or tiller transplantation to a new key. If twisted by 15° or more, and if cracks are found, the rudder stock shall be replaced.

5.4 ANCHOR ARRANGEMENT

5.4.1 Initial survey.

5.4.1.1 During initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), the compliance of anchor arrangement design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service, shall be verified; for this purpose the following shall be checked:

.1 compliance of the anchor arrangement design and specified anchor-heaving speed being ensured, with the requirements of the Rules for INS Construction;

.2 technical condition of the anchor arrangement to evaluate the quality of its manufacture and to detect any defects (wear, damage, failures) during operational testing, to determine its readiness for use and serviceability;

.3 compliance with the requirements of the Rules for INS Construction with respect of anchors, anchor chains and ropes provided on board. During this survey, the shipowner shall submit certificates for anchors, anchor chains and ropes.

5.4.1.2 Survey of anchor arrangement during initial survey of the ship in service is carried out in the scope of special survey.

5.4.2 Intermediate survey.

5.4.2.1 The summarized scope of anchor arrangement surveys during intermediate surveys of ships is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

5.4.2.2 Anchor arrangement is examined and operationally tested through dropping or lowering and hoisting of anchors.

5.4.2.3 Anchors, hawse pipes, swivels, stoppers, ropes and chains are shall be examined externally.

5.4.2.4 Machinery, systems and electrical equipment forming part of the anchor arrangement are surveyed in compliance with the requirements to be found in the relevant sections of this Part.

5.4.2.5 When assessing the technical condition of the anchor arrangement, the wear and defect rates given in 5.4.3.8 shall be considered.

5.4.3 Special survey.

5.4.3.1 The summarized scope of anchor arrangement surveys during special surveys of ships is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

5.4.3.2 Anchors and hawse pipes, chain cables and wire ropes, stoppers and devices for releasing the inboard end of a chain cable shall be thoroughly examined. Means for drainage of chain lockers shall be operationally tested. Anchor chains shall be rolled from the chain locker, cleaned and arranged for examination, anchors shall also be cleaned and laid down for examination.

Where markings and brands have been worn smooth over time, they shall be restored.

Anchors and chain cables shall be checked for completeness.

5.4.3.3 During survey of the ship, the anchor arrangement shall be operationally tested, and the anchor-hoisting speed shall be checked. Besides, the operation of stoppers and the device for releasing the inboard end of chain cable shall be checked.

5.4.3.4 Operational testing of the anchor arrangement shall be carried out by dropping and hoisting of anchors at a depth of not less than 40 m. However where the maximum depth in the ship's restricted area of navigation is less than 40 m, the testing may be carried out at the maximum depth.

5.4.3.5 When checking the spare parts of the anchor arrangement, the requirement for providing the third (spare) anchor on board may be omitted.

5.4.3.6 Starting from the second special survey, anchor chains shall be measured. If the average diameter of chain links is less than permitted, chain lengths shall be replaced.

5.4.3.7 Machinery, systems and electrical equipment forming part of the anchor arrangement are surveyed in compliance with the requirements to be found in the relevant sections of this Part.

5.4.3.8 When assessing the technical condition of the anchor arrangement, the following shall be considered:

anchor chain links, as well as swivel, shackle and anchor components shall be replaced if their average diameter in the most worn-out area is reduced by 12 % and more of the initial nominal diameter, and also if cracks and deformations are revealed. The average diameter shall be determined as a half-sum of the minimum diameter of a link or component cross section and the diameter measured perpendicularly within the same section;

the application of chain links with fallen out or weakened studs is not permitted; when repairing such links, weakened steel studs strengthened along their perimeter by electric welding at one end of the stud or by the link squeezing;

where a chain length is found to contain links with small cracks or fractures not in way of welded joints, such chain length, after the defective links have been replaced, shall be heat-treated in compliance with the procedure specified by the repairing works; after the heat treatment the chain length shall be tested by a proof load;

a steel rope shall be replaced if the number of broken wires is 1/10 and more of their total number at any point of its length equal to eight times the diameter, or if the wire diameter is reduced by 40 % and more as compared to the initial value as a result of the surface wear or corrosion, as well as where the rope is excessively deformed;

where the anchor mass is reduced by 20 % and more as a result of corrosion wear, the anchor shall be replaced;

where a fluke angle relative to the shank is changed by 50 %, pins and shank holes wear amounts to 10 % and more, or if these components are cracked, the anchor shall be replaced.

5.5 MOORING ARRANGEMENT

5.5.1 Initial survey.

5.5.1.1 During the initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), the compliance of mooring arrangement design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service, shall be verified, for this purpose the following shall be checked:

.1 compliance of the mooring arrangement design with requirements of the Rules for INS Construction to ensure performance of mooring operations;

.2 technical condition of the mooring arrangement to evaluate the quality of its manufacture and to detect any defects (wear, damage, failures) during the operational testing, to determine its readiness for use and serviceability;

.3 compliance with the requirements of the Rules for INS Construction with respect of mooring ropes (length, strength, design). During this survey, the shipowner shall submit certificates for mooring ropes.

5.5.1.2 Survey of mooring arrangement during initial survey of the ship in service shall be carried out in the scope of special survey.

5.5.2 Intermediate survey.

5.5.2.1 The summarized scope of mooring arrangement surveys during intermediate surveys of ships is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

5.5.2.2 Mooring arrangement shall be examined and operationally tested.

5.5.2.3 Bollards, hawse pipes, reels, fairleads and ropes shall be externally examined.

5.5.2.4 Machinery and electrical equipment forming part of the mooring arrangement are surveyed in compliance with the requirements to be found in the relevant sections of this Part.

5.5.2.5 When assessing the technical condition of the mooring arrangement, the wear and defect rates given in 5.5.3.5 shall be considered.

5.5.3 Special survey.

5.5.3.1 The summarized scope of mooring arrangement surveys during special surveys of ships is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

5.5.3.2 During special survey of the ship, the machinery, systems and electrical equipment forming part of the mooring arrangement shall be thoroughly examined and operationally tested.

5.5.3.3 During survey, bollards, hawse pipes, fairleads, ropes and other equipment shall be externally examined.

5.5.3.4 Machinery, systems and electrical equipment forming part of the mooring arrangement are surveyed in compliance with the requirements to be found in the relevant sections of this Part.

5.5.3.5 When assessing the technical condition of the mooring arrangement, the following shall be considered:

a steel mooring rope shall be replaced, if the number of broken wires is 1/10 and more of their total number at any point of its length equal to eight times the diameter, or if the wire diameter is reduced by 40 % and more as compared to the initial value as a result of the surface wear or corrosion, as well as when the rope is excessively deformed;

fibre ropes and synthetic ropes shall be replaced if their yarns are torn, the ropes are rotten, excessively worn or deformed;

rollers of fairleads, guide rollers, bollards, hawse pipes and warping drums shall be free of excessive wear, scores or other damages.

5.6 TOWING AND PUSHING ARRANGEMENTS

5.6.1 Initial survey.

5.6.1.1 During the initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), the compliance of towing and pushing arrangements design with requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service shall be verified with due regard for the requirements of the following editions of these Rules covering the ships in service. In doing so the following shall be verified:

.1 compliance of towing and pushing arrangements design with the requirements of the Rules for INS Construction to ensure performance of towing operations;

.2 technical condition of the towing and pushing arrangements to evaluate the quality of their manufacture and to detect any defects (wear, damages failures) during the operational testing, to determine their readiness for use and serviceability;

.3 compliance with the requirements of the Rules for INS Construction with respect of tow line length, strength, design, as well as of tow hook, towing rail, towing arch, wire stopper, bollard, chock, bitt and towing port design. During this survey, the shipowner shall submit certificates for tow lines and hooks.

5.6.1.2 Survey of towing and pushing arrangements during initial survey of the ship in service shall be carried out in the scope of special survey.

5.6.2 Intermediate survey.

5.6.2.1 The summarized scope of surveys of towing and pushing arrangements during intermediate surveys of ships is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

5.6.2.2 Towing and pushing arrangements, as well as towing winches and their equipment shall be examined and operationally tested. Tow hooks are subject to close-up survey.

5.6.2.3 On tugs, tow hooks, towing rails, towing arches and wire stoppers shall be examined.

5.6.2.4 Machinery, systems and electrical equipment forming part of the towing arrangement are surveyed in compliance with the requirements to be found in the relevant sections of this Part.

5.6.2.5 When assessing the technical condition of the towing arrangement, the wear and defect rates given in 5.6.3.4 shall be considered.

5.6.3 Special survey.

5.6.3.1 The summarized scope of surveys of towing and pushing arrangements during special surveys of ships is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

5.6.3.2 Machinery, systems and electrical equipment forming part of the towing arrangement are surveyed in compliance with the requirements to be found in the relevant sections of this Part.

5.6.3.3 Tow hooks complete with their remote controls and overload protection devices (on tugs and push-tugs), towing rails, towing arches, cable stoppers, bollards, towing bitts, hawse pipes and tow lines shall be thoroughly examined.

The remote controls of the tow hook shall be operationally tested.

5.6.3.4 When assessing the technical condition of the towing arrangement, the following shall be considered:

a steel tow line and a coupling rope shall be replaced if the number of broken wires is 1/10 and more of their total number at any point of their length equal to eight times the diameter, as well as where the tow line (rope) is excessively deformed;

a fibre rope shall be replaced if its yarns are torn, the rope is rotten, excessively worn or deformed;

hooks, bollards, towing bitts and hawse pipes shall be free of excessive wear, scores or other damages.

5.7 WHEELHOUSE VERTICAL MOVEMENT ARRANGEMENT

5.7.1 Initial survey.

5.7.1.1 During the initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), the compliance of wheelhouse vertical movement arrangement design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service, shall be verified, for this purpose the following shall be checked:

.1 compliance of the wheelhouse vertical movement arrangement design with the requirements of the Rules for INS Construction to ensure the arrangement use according to its purpose and the safety of people on board the ship;

.2 technical condition of the arrangement to evaluate the quality of its manufacture and to detect any defects (wear, damage, failures) during the operational testing, to determine its readiness for use and serviceability.

5.7.1.2 Survey of wheelhouse vertical movement arrangement during initial survey of the ship in service shall be carried out in the scope of special survey.

5.7.2 Intermediate survey.

5.7.2.1 The summarized scope of wheelhouse vertical movement arrangement surveys during intermediate surveys of ships is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

5.7.2.2 Drive mechanisms for wheelhouse hoisting and lowering, audible and visual alarm forming part of the wheelhouse vertical movement arrangement shall be examined and operationally tested.

5.7.2.3 Machinery, systems and electrical equipment forming part of the wheelhouse vertical movement arrangement shall be surveyed in compliance with the requirements to be found in the relevant sections of this Part.

5.7.3 Special survey.

5.7.3.1 The summarized scope of wheelhouse vertical movement arrangement surveys during special surveys of ships is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

5.7.3.2 Drive mechanisms for wheelhouse hoisting and lowering, limit switches, audible and visual alarm forming part of the wheelhouse vertical movement arrangement shall be subject to close-up survey and operation tests. The emergency wheelhouse lowering mechanism shall be operationally tested as well.

5.7.3.3 Machinery, systems and electrical equipment forming part of the wheelhouse vertical movement arrangement shall be surveyed in compliance with the requirements to be found in the relevant sections of this Part.

5.7.3.4 When assessing the technical condition of the wheelhouse vertical movement arrangement, the applicable wear and defect rates given in the relevant sections of this Part shall be considered.

5.8 CARGO HANDLING GEAR

5.8.1 General.

5.8.1.1 Cargo handling gear of inland navigation ships shall meet the requirements of the Rules for the Cargo Handling Gear of Sea-Going Ships.

5.8.1.2 For instructions on survey of cargo handling gear refer to 4.1.6, Part III "Survey of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for the Equipment of the Sea-Going Ships" of the Guidelines on Technical Supervision of Ships in Service.

5.9 EQUIPMENT OF BULK CARGO HOLDS

5.9.1 General.

5.9.1.1 Fixed equipment for bulk cargo separation shall be subject to external examination during intermediate surveys and thorough examination during each special survey of the ship.

5.9.1.2 Aboard ships designed or adopted for bulk cargo carriage, the availability shall be checked of the approved bulk cargo loading plan and Stability Booklet; besides, the technical condition of fixed equipment for bulk cargo separation (bulkheads, feeders, arrangements for their securing to the ship structures) shall be assessed.

5.9.1.3 When assessing the technical condition of the fixed equipment, the wear and defect rates relating to ship's hull structures shall be applied.

5.10 EMERGENCY OUTFIT

5.10.1 General.

5.10.1.1 During all the types of surveys of ships with crew members on board, the availability, completeness, condition and storage of emergency outfit in compliance with the requirements of Section 11, Part III "Equipment, Arrangements and Outfit" of the Rules for INS Construction shall be checked.

6 FIRE PROTECTION SURVEY

6.1 GENERAL

6.1.1 The summarized scope of surveys of fire protection items during periodical surveys of ships is given in Table 1.3.

6.1.2 This Section sets the requirements for fire protection items that are subject to surveys.

6.1.3 Fire protection items shall be surveyed during initial, special and intermediate surveys of ships, and under special circumstances also during occasional surveys.

6.1.4 After repair or installation of new items of fire protection on ships, the tests shall be conducted as stipulated for their manufacture and installation onboard, and also the documents confirming the RS technical supervision during their manufacture shall be submitted.

6.1.5 For the purpose of all types of surveys, the fire protection items shall be prepared accordingly, and access, opening-up and dismantling shall be ensured, where necessary.

The extent of examinations, measurements, tests prescribed by in this Section and related works (openings-up, disassembling, dismantling), may be changed by the surveyor with due regard to the structural features, service life, results of the previous survey, operation tests.

6.2 INITIAL SURVEY

6.2.1 During the initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), it shall be checked whether the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service, are complied with, in view of the intended ship purpose with due regard to its design and dimensions in respect of the following:

- arrangement and equipment of ship spaces, a fire extinction station and fire control stations;
- safe evacuation of people from accommodation and service spaces;
- division of hulls, superstructures and deckhouses of passenger ships into main vertical fire zones, and protection of spaces inside fire zones, on the ships of other purposes, division of the spaces inside superstructures in accordance with means of fire protection;
- application of non-combustible materials when insulating and outfitting of ship spaces;
- using relevant fire-resistant and fire-retarding divisions, as well as closures of openings therein;
- installation of self-closing fire doors, their remote control and automation systems;
- closure of doors, trunks, ventilation ducts, annular spaces of stacks, skylights and other openings of cargo and machinery spaces, in pump rooms and their drives, closing of air spaces behind ceilings with paneling and linings;
- mandatory list of fire extinguishing systems;
- technical characteristics and arrangement of machinery of systems, material and design of piping, its connection and valves, laying and attachment;
- remote control drives of valves and machinery of systems;
- fire detection and alarm systems and fire warning alarms;
- completeness of fire-fighting outfit, including emergency escape breathing devices, spare parts and tools;
- fire alarm;
- availability of guide signs showing the way to fire plans locations, and condition of these plans enclosures, as well as marking and condition of cabinets and enclosures for fire hoses (with hose nozzles);
- fire-fighting equipment, fire detection and alarm system equipment, means of access to different compartments, and escape routes;
- availability of marking of control stations, fire extinction stations, fire-fighting equipment and outfit locations, etc. with coloured graphical symbols in accordance with Fire Control Plan;
- availability of the certificates and/or results of analyses of fire extinguishing media used in fire extinguishing systems, as well as their required quantity;
- compliance with fire safety requirements for domestic and ship equipment and systems (refer to Section 3, Part V "Fire Protection" of the Rules for INS Construction). Before putting the liquefied gas installations for domestic purposes in operation after each modernization or repair, and in case of each renewal of the certificate for liquefied gas installations for domestic purposes, these installations shall be approved by a survey commission or a specialist authorized by the shipowner. The certificate is valid not more than 3 years.

6.2.2 Survey of fire protection items during initial survey of the ship in service shall be carried out in the scope of special survey.

6.3 INTERMEDIATE SURVEY

6.3.1 The summarized scope of fire protection items surveys during intermediate surveys of ships is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

6.3.2 During intermediate survey, the fire bulkheads and decks shall be examined, as well as closing appliances of openings therein, fire doors, closing appliances of external openings (ventilation ducts, annular spaces of stacks, skylights). The remote control systems of fire doors shall be operationally tested.

6.3.3 Fire extinguishing systems shall be examined and operationally tested complete with cylinders, tanks, arrangements, equipment and outfit.

The piping of carbon dioxide smothering systems, fire extinguishing using freons, foam fire extinguishing systems shall be air-tested for free passage of the medium transferred.

The aerosol fire extinguishing systems shall be checked by means of visual examination of the working order through indication on the remote control device and the efficiency of fastening of system equipment and cables.

The operational testing of fire extinguishing systems shall be carried out concurrently with that of their pumps, compressors, ventilators, apparatuses and pressure vessels, by which they are served, along with testing of their systems, connecting devices, remote control drives, automation systems and devices, and monitoring devices.

Visual and audible alarms warning of the starting of a fire extinguishing system shall be operationally tested.

All cylinders for the storage of fire extinguishing medium shall be surveyed, and a check for completeness and external examination shall be carried out in respect of fire-fighting outfit, including emergency escape breathing devices (their expiry date shall be checked), spare parts and tools.

At survey of cabinets (boxes) for fire hoses it is necessary to check the structure integrity, drainage and absence of corrosion.

6.3.4 For the purpose of survey of fire smothering systems, it shall be checked whether the volume of fire extinguishing medium is sufficient, whether the cylinders bear the stamps of competent authorities, as well as whether certificates from a recognized laboratory or competent body are available to testify that the fire extinguishing medium may be used.

6.3.5 Liquefied gas installations for domestic purposes shall be checked for the availability of valid documents on periodical surveys and tests carried out by specialized organizations or the specialists authorized by the shipowner.

6.3.6 Fire alarm systems shall be operationally tested.

6.3.7 Instructions and recommendations on the checks and examinations of fire hoses, couplings, fire hose nozzles, foam generators and self-contained breathing apparatuses carried out during intermediate surveys are specified in 6.5.

6.4 SPECIAL SURVEY

6.4.1 The summarized scope of fire protection items surveys during special surveys of ships is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

6.4.2 During special survey of the ship, it shall be verified whether the list of fire protection items, their completeness, structure, arrangement and installation, as well as of specified characteristics comply with the requirements of the Rules for the Classification and Construction of Sea-Going Ships. The technical condition of items shall be assessed in order to find out possible defects.

6.4.3 Structural fire protection.

During examination of the structural fire protection, the condition of insulation of fire-resistant and fire-retarding divisions and closures of openings therein shall be checked; where necessary, certain areas of cladding and insulation may be opened up.

The serviceability of closures, including those with a remote drive, fire doors, trunks, ventilation ducts, annular spaces of stacks, skylights and other openings in cargo and machinery spaces, in the pump rooms, as well as their drives, shall be checked.

During examination, attention shall be paid to the fact whether the relevant structural, insulating, finishing and coating materials are applied in repairs and replacement of equipment in ship spaces in order to use non-combustible, not readily ignitable, low flame-spread materials, which are not hazardous as regards generation of smoke, toxic and explosive products.

6.4.4 Fire extinguishing systems.

6.4.4.1 During survey and operational testing of fire extinguishing systems, their readiness for immediate use, serviceability and retaining of their rated capacity shall be checked.

6.4.4.1.1 When water fire main system is operationally tested, the serviceability of the remote starting of fire pumps, as well as emergency fire pump together with its sea chest shall be checked. When a portable motor pump is used as an emergency fire pump on the ships constructed before 1 September 1984, then instructions of 6.5.6 shall be taken into consideration during its survey.

6.4.4.1.2 During operational testing of sprinkler system, the actuation of control valves (by means of opening-up the sprinkler or control branch pipe), the alarm signal injection, the operation of devices for automatic pressure maintenance and water level control in the pressure tank, as well as the automatic starting of pumps and compressors shall be checked.

The pressure tank shall be examined externally and internally.

The internal examination shall be carried out at each special survey of the ship starting with the second one.

6.4.4.1.3 When water-screen system is operationally tested, the remote start-up shall be checked.

6.4.4.1.4 When water-spraying system is operationally tested, the serviceability of the remote control of shut-off valves and automatic start-up of the pump by the pressure drop in the system shall be checked.

6.4.4.1.5 When foam fire extinguishing system is operationally tested, the serviceability of the remote opening of sea chest valve shall be checked.

Availability of the required foam concentrate quantity shall be checked. The quality of foam concentrate and foam expansion ratio shall be confirmed by the document of the competent body. For instructions on survey of foam concentrate refer to 6.5.2.

6.4.4.1.6 During survey of inert gas systems, the non-return valves and flame arresters on piping supplying gas to compartments of tankers shall be examined. When the system is operationally tested by trial release of gas into protected spaces, the serviceability of starting devices and automatic gas control devices with an audible and visual alarm shall be checked.

6.4.4.1.7 During survey of fire extinguishing system using freon 114B2, the freon storage tanks shall be internally surveyed in the following cases:

if the results of the freon quality check indicate the necessity of its replacement by a new one (or regenerated);

after intended use of freon or after freon release from the tanks. The freon quality shall be confirmed by the document issued by the competent body;
after detection of partial or full freon leakage;
during repair of tanks.

Availability of the required freon quantity shall be checked. The freon quality shall be confirmed by the documents of the competent body. The system shall be operationally tested by discharge of compressed air instead of freon. Starting from the third special survey upon results of the external examination and tank thickness measurement it is necessary to make a decision on necessity of the internal survey and hydraulic tests.

Absence of freon leakages in cylinders (based on the readings of pressure indicators fitted on each cylinder) shall be checked during survey of fire extinguishing systems using freon 1301(13B1).

For instructions on survey of cylinders for storage of freon 114B2, as well as freons 1211(12B1) and 1301(13B1) refer to 6.5.5.

6.4.4.1.8 During survey of carbon dioxide smothering system, the valves of carbon dioxide cylinders shall be examined together with their safety devices and control appliances indicating the actuation of safety devices, the functioning of audible device signalling about the damage of safety membranes, of devices for individual, group and remote opening of cylinder valves shall be checked.

During examination of the cylinders, presence of carbon dioxide therein shall be checked according to the weighing report (or according to measurement by any other approved procedure) submitted by the ship's officers. The total carbon dioxide quantity shall not be less than 0,9 of the design value, at that the quantity of carbon dioxide in each cylinder may be increased by not more than 0,5 kg.

The system may be operationally tested by discharge of compressed air instead of carbon dioxide.

At least 10 % of all high pressure carbon dioxide cylinders shall be subjected to hydraulic testing after 10 years. If one or more carbon dioxide cylinders fail, a total of 50 % of onboard cylinders shall be subject to hydraulic tests. Flexible hoses shall be replaced at intervals recommended by the manufacturer and not exceeding 10 years.

When surveying the cylinders, internal survey and hydraulic testing dates shall be assigned in the following way: for cylinders that have undergone the hydraulic tests at the recognized test station (10 %), on the basis of stamps of this test station, and for cylinders that have not undergone hydraulic tests (90 %), on the basis of the previous Register survey reports.

In well-grounded cases and proceeding from the service life, survey results, repairs and replacements effected, checking of the safety valves of low-pressure carbon dioxide smothering system tank may be required, as well as heat insulation in compliance with the requirements of 3.8.3.6, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships.

The tanks of low-pressure carbon dioxide smothering system shall be subjected to the internal survey after repair and after discharge of the carbon dioxide, if the tank is older than five years.

Hydraulic testing of the tank may be requested by the surveyor proceeding from the internal survey results. At that, the surface under heat insulation shall be checked at random for corrosion. Where necessary, insulation removal shall be carried out according to the procedure recommended by the tank manufacturer.

6.4.4.1.9 During survey of the aerosol fire extinguishing system, the latter shall be tested by means of simulating its actuation with fire extinguishing aerosol generators being cut out of the starting circuits. Special simulators shall be connected during the tests instead of generators.

Subject to monitoring are:

- visual and audible indication on the remote control device (RCD);
- delay time of starting and simulation of generators' starting;
- disconnection of ventilation in the protected space;
- alarm actuation in the protected space;
- cable insulation resistance;
- arrangement and external view of generators.

Resistance of the aerosol fire extinguishing system shall be checked to false activation through connection of a special starting unit simulator to each starting circuit, and this being done, the generator shall be cut out of the starting circuit.

As far as practicable, the tests shall be carried out with all electric power consumers being under working conditions.

Fire extinguishing aerosol generators shall be surveyed considering the number of generators limited by a manufacturer for testing and dates of checking of their fitness by competent bodies (or accredited laboratories) or dates of generators' replacement by new generators established by the manufacturer.

6.4.4.1.10 During survey of dry powder system, the reservoirs for storage of powder shall be subjected to internal survey starting from the second special survey.

Quantity of powder in reservoirs shall be confirmed by the relevant report.

The system may be operationally tested by compressed air.

During examination of the cylinders, presence of carrier gas shall be checked according to the weighing report (or measurement by any other approved procedure) submitted by the ship's officers. Quantity of carrier gas shall not be less than that required for single power discharge from the reservoir.

6.4.5 Liquefied gas installations for domestic purposes.

Liquefied gas installations for domestic purposes shall be checked for the availability of valid documents on periodical surveys and tests carried out by specialized organizations or specialists authorized by the shipowner.

6.4.6 Fire detection and alarm systems.

Fire detection and alarm systems and alarms intended to warn of fire smothering systems being activated shall be operationally tested and externally examined to determine serviceability of the automatic fire detection and alarm system in case of heat, light or smoke detectors' operation in the protected space, to determine serviceability of manual fire alarms in case of the detectors' operation in protected spaces and on decks, serviceability of fire warning system (alarm system), and that of audible and visual alarms intended to warn of the fire smothering system being activated in protected spaces and of its interlocking with the manual and remote starting of the fire extinguishing system.

6.4.7 Fire-fighting outfit. Spare parts and tools.

6.4.7.1 During survey of fire-fighting outfit, motor pumps shall be operationally tested. For additional instructions on survey of motor pump refer to 6.5.6.

6.4.7.2 The completeness of fire-fighting outfit, spare parts and tools shall be checked, and they shall be externally examined; besides, compliance with schedule of mandatory periodical checks of instruments, self-contained breathing apparatuses and fire extinguishers shall be verified. Availability of documents (certificates) for the elements of the fireman outfit (protective clothing, breathing apparatus, safety lantern, safety rope, etc.) shall be checked.

The completeness of emergency breathing apparatuses, their expiry dates and availability of certificates for these apparatuses shall be checked.

For additional instructions on survey of self-contained breathing apparatuses refer to 6.5.3.

6.4.7.3 All fire hoses shall be subjected to hydraulic tests by the working pressure of the water fire main system. During survey of cabinets (boxes) for fire hoses, it is necessary to check the structure integrity, drainage and absence of corrosion. For additional instructions on survey of fire hoses and hose couplings, and on assessment of their condition refer to 6.5.1.

6.5 RECOMMENDATIONS ON SURVEY OF FIRE PROTECTION ITEMS

6.5.1 Recommendations on survey of fire hoses, hose couplings and hose nozzles:

.1 agreed and acceptable for the shipowner measures shall be taken onboard the ship for identifying fire hoses to ensure their supervision on a given ship. The identification may be provided by any acceptable way: marking with durable paint, stamping, labelling, etc.;

.2 fire hoses shall be made of wear-resistant material approved by the Flag State Administrations. Such hoses shall be provided for ships constructed on or after 1 February 1992; on ships constructed before 1 February 1992, these hoses shall be provided during regular replacement.

In particular, such hoses imply the ones with double-faced polymeric coating, and also those made on the basis of chloroprene latex.

Canvas, flax and jute hoses are liable to replacement on due date.

Natural latex-based hoses with film resistance of +70 °C are fit for use in medium latitudes only.

New fire hoses shall have the Certificate of Conformity issued by the technical supervision body (e.g., IACS member), or the certificates of the manufacturers certified by the Flag State Administration on conformity to the requirements of SOLAS 74/78.

With the replacements as the above, the area and routes of navigation of a particular ship and the results of technical supervision over the given outfit shall be taken into account.

.3 during surveys, special attention shall be given to the material of hose couplings and hose nozzles bearing in mind that:

on oil tankers carrying oil products with a flash point below 60 °C, on gas carriers and chemical tankers, these items made of steel and other sparking alloys are not allowed;

on all the other ships, these items made of any alloys, including aluminium ones (which have a durable external and internal anticorrosion coating), may be located both on open decks and in internal spaces;

the items made of aluminium alloys and having no anticorrosion coating shall be replaced by the items made of materials, which are resistant to sea exposure, basing on the survey results and by the dates agreed;

.4 when estimating the scope of the inspection of the fire hoses during annual and special surveys, the dates of their delivery on board, the term of storage conditions in stock and their locations shall be taken into account, and the external examination of the surface, binding and junk-rings condition shall be included in the scope of the inspection.

Hydraulic tests shall be conducted under working pressure of the water fire main system. The necessity to perform such tests shall be ascertained in each particular case with due regard to the external examination results. Hoses shall be tested at least once in three years, as well as during special survey (in case of their compliance with the requirements of regs. II-2/4.7 or II-2/10.2.3 in SOLAS 74 as amended, as applicable).

.5 cabinets (boxes) for fire hoses are liable to external and internal examination to check their structural integrity, safety of locks, drainage and the presence of marking;

.6 manufacturer's manual on the maintenance and testing of fire hoses shall be available on board the ship.

6.5.2 Recommendations on survey of foam concentrates:

.1 during survey of foam concentrates onboard, it shall be ascertained that:

a foam concentrate used onboard the ship in the foam fire extinguishing system, in portable foam applicators or in tanks within the water fire main system shall be approved by the Register;

the foam concentrate storage time does not exceed 3 years;

.2 if three years have passed (according to an entry made in a record card), the shipowner shall submit the conclusion of the RS- or ACS-recognized laboratory confirming foam concentrate fitness for use;

.3 the laboratory conclusion shall be issued based on the tests conducted according to the procedure set forth in the IMO circulars (refer to MSC/Circ.582 dated 29 April 1992, MSC/Circ.798 dated 9 June 1997, MSC/Circ.670 dated 5 January 1995) and shall contain the following foam concentrate characteristics: sedimentation, pH value, expansion ratio, drainage time and volume mass.

6.5.3 Recommendations on survey of self-contained breathing apparatuses:

during survey of self-contained breathing apparatuses, it shall be verified that:

they are of the RS-approved type;

they contain sufficient supply of air (at least 1200 l);

on oil tankers, gas carriers and chemical tankers only apparatuses operating on compressed air are used;

the apparatuses condition is periodically checked at specialized firms (stations) which shall be marked in a record card;

the number of apparatuses corresponds to that prescribed for a given ship by the Flag State Administration;

self-contained breathing apparatuses are kept in the locations shown in the fire plans.

6.5.4 Recommendations on survey of portable fire extinguishers:

.1 periodical examinations and maintenance of portable fire extinguishers are carried out at least once a year in accordance with the manufacturer's instructions prepared in compliance with the requirements of recognized standards (the recognized international standard is ISO 7165:1999 "Fire-fighting – Portable fire extinguishers – Performance and construction", and the recognized national standard in the RF is GOST R 51057-2001 "Portable fire extinguishers – General technical requirements – Test methods"), and in addition:

.1.1 at least one fire extinguisher of each type manufactured in the same year and kept on board the ship shall be operationally tested under the Register technical supervision at intervals not exceeding 5 years;

.1.2 all extinguishers together with propellant cartridges shall be hydraulically tested in accordance with the manufacturer's instructions or the recognized standard, according to which the extinguisher is produced at intervals not exceeding 10 years;

.2 maintenance and examination of fire extinguishers having no Register approval may be carried out provided that the Register has preliminarily considered their technical documentation and singly approved them with issuing the Certificate (form 6.5.30);

.3 maintenance and examination of fire extinguishers are carried out at the firms recognized by the Register for performing survey and maintenance of portable fire extinguishers. In specific cases, examinations and maintenance may be carried out at the firms, which have no Register's relevant recognition, but are recognized by the state competent authority, under the technical supervision of the surveyor to the Register. In any case, the firm shall have available, and follow, the manufacturer's manual and have at its disposal equipment, replaceable parts, recommended extinguishing media, etc. needed for the given type of servicing according to the manufacturer's manual;

.4 recharge of fire extinguishers is carried out in accordance with manufacturer's manual. The manual for recharging fire extinguishers shall be submitted by manufacturers and be available for use onboard. Only the extinguishing media approved for a specific extinguisher shall be used for recharging;

.5 reports on performance of fire extinguishers examination shall be submitted to the surveyors to the Register on their demand. These shall include the date of examination, the type of maintenance carried out and whether or not a pressure test was performed.

6.5.5 Recommendations on survey of freons storage tanks:

.1 survey of tanks for storage of freon 114B2:

the cases when the internal survey of freon 114B2 storage tanks is required, are specified in 6.4.4.1.7;

starting from the third special survey it is the surveyor who makes a decision on the necessity of tank internal survey and hydraulic testing based upon results of the external examination and measurement of tank wall thicknesses;

during survey, special attention shall be paid to the mounting seats of valve heads, valves, manhole covers and other locations where defects are most likely to occur: corrosion attack, cracks, etc. Where significant wear is detected, the residual thickness of the tank wall shall be measured. If a wear of tank walls averaged over a few measurements exceeds 10 % of the initial thickness, the tank shall be replaced or repaired;

.2 survey of tanks for storage of freons 13B1 and 12B1 (terms "halon-1301" and "halon 1211" are used in the text of SOLAS 74/78, respectively):

the tanks shall be internally examined after repairs, and also after freon discharge if the tank is older than five years.

6.5.6 Recommendations on survey of portable motor pump:

during survey of motor pump used as an emergency fire pump on ships constructed before 1 September 1984, it shall be verified that:

the complete set of the motor pump is maintained, i. e. suction and delivery hoses, hose nozzles, a branch coupling for connecting the hoses; the hose type corresponds to those used in the water fire main system fitted in the ship; tools, accessories and manuals are provided in compliance with the manufacturer's specification;

where the motor pump is kept on deck, it is stored in a readily accessible special locker or box;

where the motor pump is kept in a room, the latter is enclosed with steel bulkheads and not adjacent to accommodations and a machinery space, or is enclosed with A-60 type divisions separating it from the machinery space;

the engine is easily and quickly started;

the self-priming device is reliable in operation and water delivery with hose nozzles is ensured.

6.5.7 Recommendations on testing fire extinguishing systems and cylinders:

.1 thorough examination shall precede hydraulic tests of systems, and internal survey shall precede hydraulic tests of cylinders and tanks. All the items to be tested shall be in good working order. Following tests, the systems shall be thoroughly blown through with compressed air and tested in operation;

.2 hydraulic tests of carbon dioxide cylinders and their internal survey shall be carried out by the specialized stations recognized by the Register or Flag State Administrations;

.3 fire extinguishing systems, piping and valves forming part thereof shall be tested in accordance with Table 6.5.7.3.

Table 6.5.7.3

Tests of fire extinguishing systems, cylinders

Nos.	Systems and assemblies to be tested	Hydraulic test pressure onboard
1	Foam and water fire extinguishing systems (refer also to Section 20, Part VIII "Systems and Piping" of the Rules for the Classification and Construction of Sea-Going Ships)	In operation
.1	pipes	1p
.2	pipes of sprinkler system	1p (by air)
2	Pipes of dry powder system	
3	Carbon dioxide smothering systems	
3.1	High pressure system:	
.1	pipes from cylinders to release control valves; transit pipes passing through spaces (refer to 3.1.4.1.3, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships)	1,5p
.2	pipes from release control valves to nozzles, and pipes from safety devices	5 MPa
3.2	Low pressure system:	
.1	pipes from a tank to release control valves	1,5p
.2	pipes from release control valves to nozzles, and pipes from safety devices	1p
4	Pipes and the scrubber of the inert gas system	1p (by air)
5	Freon 114B2 fire extinguishing system:	
.1	pipe from tanks to nozzles	1,5p
6	Pneumatic pipes	1,5p
7	Cylinders, containers and tanks:	
.1	pressurized, including cylinders without valves	—
.2	non-pressurized	In assembly with system
.3	cylinders with screwed-in valves	—
8	Valves	—
<p>Notes: 1. <i>p</i> is maximum working pressure in the system; for the carbon dioxide smothering system, <i>p</i> is design pressure of the cylinder or cylinder valve (whichever is less), or the tank, in MPa.</p> <p>2. Valves as an assembly shall be tested for tightness of closing at a pressure of at least 1,25<i>p</i>. The valves of carbon dioxide cylinders shall be tested for tightness at the highest breaking pressure of protective diaphragms according to 3.8.2.6.1, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships.</p> <p>3. The system shall be tested as an assembly on board the ship after completion of all mounting works.</p> <p>4. Pipes of water fire main system in ships of 500 gross tonnage and upwards (refer to 3.2.5.1, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships) shall be tested at a pressure of at least 1 MPa.</p> <p>5. The hydraulic test pressure for testing the freon 114B2 storage tanks and pressure tanks of the sprinkler system shall be assumed equal to 1,25<i>p</i>, but at least 0,2 MPa. The tanks inaccessible for an internal survey shall be tested at a pressure of at least 1,5<i>p</i>.</p> <p>6. The hydraulic test of carbon dioxide cylinders is as required in 6.5.7.2.</p>		

7 SURVEY OF MACHINERY INSTALLATIONS

7.1 GENERAL

7.1.1 During survey of machinery installation, the applicable requirements of Part I "General Provisions" for carrying out survey of ships, as well as of Section 1 of this Part shall be met.

7.1.2 This Section sets the requirements for survey of machinery installations using fuel oil with flash point not less than 43 °C for emergency diesel-generators, and not less than 60 °C for other diesel engines and boilers.

Survey of machinery installations using fuel oil with a flash point of less than those specified above shall be carried out in compliance with the requirements established by the Register in each particular case.

7.1.3 Machinery installation shall be surveyed during initial, special and intermediate surveys of ship, and under special circumstances – also during occasional surveys.

Where extension of special survey was granted to a ship, as well as in other justified cases, the performance of thorough examinations associated with opening-up, disassembling or dismantling, performance of hydraulic and other types of tests, as well as carrying out of other surveys of machinery installation items as stipulated for special survey of the ship may be extended for the period not exceeding 3 months provided that special survey shall be carried out which scope is determined proceeding from the scope of intermediate survey. Extension of survey is granted to a ship if no doubts arise as a result of occasional survey concerning technical condition of the items.

7.1.4 During survey of the ship, those machinery installation items may not be surveyed for the second time, which have been surveyed in the necessary scope within 12 months before the date of the survey concerned.

Where, due to some reasons, certain items shall be submitted for survey before the due date of periodical survey, the date of ship submitting for occasional survey with regard to these items shall be established.

7.1.5 For machinery installation items and their components newly installed on ships, as well as in case of their replacement, the documents on products according to the Guidelines on Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships shall be submitted

7.1.6 After repair or installation of new items of machinery installation on ships, the tests shall be conducted as stipulated for their manufacture and installation onboard. These tests shall be conducted in compliance with the Guidelines on Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships followed by issue of the relevant documents.

7.1.7 For the purpose of all types of surveys, the machinery installation items shall be prepared accordingly, and access, opening-up or dismantling of units and components shall be ensured, where necessary. Items to undergo survey and operational testing shall be submitted in working order (except for surveys in connection with repair and emergency occurrences). Upon the surveyor's request, all necessary documents (drawings, descriptions, diagrams, files or passports, etc.), as well as machinery log shall be submitted during survey.

7.1.8 The summarized scope of surveys of machinery installation items during periodical surveys is given in Table 1.3.

The extent of separate examinations, measurements, checks and tests shall be decided by the surveyor to the Register proceeding from the provisions of the relevant sections of the Rules for INS Construction and this Section and with due regard to the particular survey conditions.

The extent of examinations and measurements prescribed by this Section and related openings-up, disassembling and dismantling, in each case, may be changed by the surveyor with due regard to the structure, service life, results of the previous survey, repairs and replacements made, as well as results of the survey in accessible areas and operational testing.

Special design machinery including internal combustion engines the manufacturers of which do not recommend to open them up before their service life has expired may not be opened up during survey. Technical condition of such machinery shall be determined upon the analysis of operation documentation and operational testing results. Machinery with expired service life shall be replaced or subjected to overhaul. Where necessary, the surveyor may require to carry out non-destructive testing by one of the approved methods.

7.1.9 Survey in dry dock is an integral part of the special and intermediate surveys. Hydraulic tests of bottom and side valves installed in shell plating below the waterline and on watertight bulkheads; dismantling, thorough examination and testing for defects of the bottom and side valves installed below the waterline within the engine room, as well as testing for defects and examination of welded branches with measurement of their actual thickness shall be carried out at ship docking within the terms specified in the relevant sections of this Part and in Table 1.3.

Hydraulic tests of the sea chests are necessary after construction, conversion or repairs.

7.1.10 Table 1.3 specifies periodical surveys of the ship machinery installation which begin after construction of the ship to the RS class.

During survey of a ship which had no RS class or holding class of ACS, periodical surveys of such ships shall be carried out in accordance with Table 1.3, starting from the initial survey of the ship having regard to its age.

After completion of period specified in Table 1.3, the survey cycles shall remain unchanged and along with that, the scope of surveys may be extended depending on the technical condition and age of the items to be surveyed.

7.1.11 Surveys of the auxiliary machinery, heat exchangers and pressure vessels, equipment, systems and piping supporting operation of machinery and boilers shall be combined with survey of main machinery and boilers. Surveys of auxiliary machinery shall be combined with survey of their prime movers.

Survey of electrical equipment, as well as the automation equipment and devices associated structurally with the machinery installation items shall be carried out in compliance with the requirements of Sections 8 and 9 of this Part, respectively.

7.1.12 The technical condition of the machinery installation items shall be assessed proceeding from the survey results using information on wear, damages and defects revealed in operation, on repairs and replacements made and recorded in the ship documentation (condition assessment records, ship's reports, engine room log books, etc.).

7.1.13 Permissible wear, damage and defect rates for structures, units and components shall be determined on the basis of information contained in the manuals and data cards of manufacturers and in the normative documents developed by design offices and other organizations and approved by the Register, as well as proceeding from the provisions of the relevant chapters of this Section.

7.1.14 Proceeding from measured data, the vibrations of the main and auxiliary machinery and shafting shall be assessed in accordance with the vibration standards specified in 18.7, Part V "Technical Supervision during Construction of Ships" of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships.

7.1.15 If wear, damages or defects exceeding permissible values or dangerous for the ship's operation are found during the survey of the machinery installation items, these items shall not be considered fit for service until the defects are eliminated, and the ship shall not be found as fit for navigation. A possibility of temporary operation of the ship with certain restrictions shall be subject to special consideration of the Register in each particular case.

7.2 INTERNAL COMBUSTION ENGINES (ICE)

This Chapter sets the requirements for main and auxiliary engines with their manoeuvring and starting devices, auxiliary machinery and equipment driven by main engine and spare parts.

7.2.1 Initial survey.

7.2.1.1 During initial survey of a ship in service (refer to 3.2, Part I "General Provisions") the compliance of engine design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service shall be verified; for this purpose the following shall be checked:

.1 compliance of the engine design and its specified technical characteristics (speed, power output, etc.) being ensured, with the requirements of the Rules for INS Construction;

.2 technical condition of the engine to evaluate the quality of its manufacture, to detect any defects (wear, damage, failures) during the operational testing, to determine its readiness for use and serviceability.

7.2.1.2 During initial survey, the shipowner shall submit the technical documentation in the scope required for verification of compliance with the requirements of the Rules for INS Construction, as well as the ship documentation (documents of the classification and other competent supervisory bodies, manufacturers' certificates, etc.). List of ship technical documentation is given in Appendix 1.

7.2.1.3 Survey of engine during initial survey of the ship in service shall be carried out in the scope of special survey.

7.2.1.4 During initial survey the scope of dismantling of units and components may be reduced, or the dismantling may be omitted provided the classification certificate issued by a recognized ACS is available, or if upon results of operational testing, measurements of cylinders, crank pins and journals, crankshaft sag and crank-web deflection no doubts arise concerning the engine technical condition.

7.2.2 Intermediate survey.

7.2.2.1 The summarized scope of ICE surveys during intermediate surveys of ships is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

7.2.2.2 The engine shall be examined and operationally tested.

7.2.2.3 For the purpose of the main and auxiliary machinery operational testing, its readiness for use is checked, as well as the serviceability of manoeuvring and starting devices, remote control, regulating and protection devices, machinery driven by the main engine and driving machinery, as well as gear and couplings. It is not necessary for the machinery to achieve a specific speed, load or other parameters.

7.2.2.4 Speed governors and overspeed devices (only where the main machinery driving main generators or driving a propeller through a release gear or CPP is concerned, as well as diesel generators) shall be operationally tested.

7.2.2.5 When assessing the technical condition of the engines, the wear and defect rates given in 7.2.3.6 and 7.2.3.16 shall be considered.

7.2.3 Special survey.

7.2.3.1 The summarized scope of ICE surveys during special surveys of ships is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

7.2.3.2 Special survey covers the survey of main and auxiliary engines with their manoeuvring and starting devices, auxiliary machinery and equipment driven by main engine, gears, couplings, dampers and antivibrators.

7.2.3.3 During special survey, internal combustion engines complete with gears, couplings and reduction gear, manoeuvring, starting, shaft-turning gears, auxiliary engine-driven machinery and equipment shall be submitted for thorough examination with opening-up as necessary and with

dismantling of all units and components of the above mentioned items of machinery installation with consideration of the manufacturers' recommendations.

7.2.3.4 The following components and units of the main engine shall be surveyed:

bed plate, columns, crankcase, tie rods, foundation bolts and chocks;
engine mounting, cylinder block, cylinder covers;
cylinder liners, pistons, piston rods;
crossheads with pins and sliders, guides;
connecting rods, gudgeon pins, telescoping system;
crank, top-end, connecting rod (bottom-end), main bearings with their bolts and pins;
thrust bearing integral with the engine;
crank pins and journals;
crankshaft webs, pins for fixing balance weights on crank webs;
distributing devices including camshaft;
cams on camshafts;
bearings, valve drives, suction, exhaust and starting valves;
camshaft drives (gearing and chain gear);
safety valves (check of adjustment);
lubricators, manoeuvring and starting devices;
speed governor and overspeed device;
auxiliary machinery driven by main engine;
shaft-turning gear, torsional vibration damper and antivibrator;
exhaust-gas turbochargers¹, supercharger inter-cooler.

In case of medium-speed diesels, the dismantling of main and connecting-rod bearings and their replacement during special survey may be postponed until the end of the bearings life, as stated in the technical documentation of the diesel manufacturer. The survey scope for the auxiliary engine components and units shall be determined proceeding from the applicable provisions of this Section.

Instructions and recommendations on survey of components and units of internal combustion engines are set forth in 7.2.4.

7.2.3.5 During the survey, the measurement results and wear assessment of cylinder liners, pistons, sliders and guides (parallels), crosshead pins, gudgeon pins, crank pins and journals, crank (top-end), connecting rod (bottom-end), main and thrust bearings, camshafts, their components and drives shall be submitted to the surveyor. If found necessary, the surveyor may require for other components and units to be measured and their wear to be determined. Crank web deflection measurement data, which shall not exceed the limits contained in the technical documentation of engine manufacturers, crankshaft sag measurement data and data on the length measurement of connecting rod and crank bearings bolts shall be submitted to the surveyor.

Where auxiliary internal combustion engines are concerned, measurements of this kind, wear assessment and crank web deflection determination shall be carried out proceeding from the engine design and on the surveyor's request, as well as in case of scheduled repairs and when the dates that are stated in the maintenance manuals and technical documentation of engine manufacturers are due.

Condition of the silicone dampers shall be checked by analysis of liquid samples or thermal non-destructive testing or measurements of torsional vibrations in terms corresponding to the service life specified by the damper manufacturer or residual lifetime determined according to instruction (refer to 7.2.4.1.9 and Annex 38 to the Guidelines on Technical Supervision of Ships in Service).

For low-speed engines with the number of revolutions $< 250 \text{ min}^{-1}$, the measurements of connecting rod bolts during the first special survey may be omitted in the following cases:

relevant documents shall be demonstrated to the effect that all preventive and scheduled routine maintenance prescribed by the operation manual and the Rules for Technical Operation has been carried out within the specified time;

¹Hereinafter referred to as "GTC".

the engines have been found in good working order as a result of control tests;
the connecting rod bolts of four-stroke diesels of internal combustion engines shall be checked for residual elongation or by means of flaw inspection.

7.2.3.6 Engine units and components shall be repaired or replaced if dangerous defects or wear exceeding permissible limits are detected during the survey:

These defects include:

.1 damage to essential units and components;

cracks in engine components, such as bed plates and columns, cylinder blocks, cylinder covers, cylinder liners, pistons, crankshaft journals and crank pins and crank webs, breaking of tie rods;
deformation (bending) of crankshafts, camshafts, connecting rods, piston rods;
melting, flaking, cracking and detaching of antifriction lining of bearings;
pitting and damage to the gear teeth and pinions of camshaft drive, cam chipping of camshafts;
cracks or excessive elongation of connecting rod bolts (residual deformation of the bolts exceeding permissible values);

.2 wear of essential units and components:

wear and galling of crank pins and journals, crosshead pins, camshaft journals;
ellipticity, conicity of journals and pins beyond permissible limits, cam wear of camshafts;
piston and piston pin wear beyond permissible limits;
bearing wear, crank (top-end), connecting rod (bottom-end), main and thrust bearing clearances beyond permissible limits, reduction of antifriction lining thickness in bearings beyond permissible limits;
cylinder liner wear beyond permissible limits;

.3 defects of essential units and components:

crankshaft deflection and sag values exceeding permissible limits stated in technical documentation;
insufficient tightness of crank pins and main journals fit in built-up and semi-built crankshafts and of cam plates on camshafts;
leakage in cylinder liner seals;
improper fit of shaft journals to bearings involving base surface reduction for bearing liners;
misalignment beyond permissible limits.

7.2.3.7 When special survey is completed and defects found are eliminated, the engines shall be submitted for operational testing. During special survey, the main engines shall be submitted for operational testing in the course of running and mooring trials taking into account the conditions specified in Table 7.2.3.7.

Table 7.2.3.7

Power, in kW	Duration of testing, in h
Internal combustion engines	
not more than 750	3
751 — 2250	5
more than 2250	7
<p>Notes: 1. Duration of testing during running trials may be changed by the surveyor proceeding from the machinery technical condition.</p> <p>2. Total duration of testing includes the time necessary for different load testing, including astern and the minimum stable speed (for internal combustion engines), at that the full load conditions (not less than 90 % of rated power) shall not be less than 70 % of the total duration of testing.</p> <p>3. The time necessary for the machinery warming-up is not included in the total duration of testing.</p> <p>4. When during mooring trials the load of the main machinery corresponds to the running conditions (CPP, propeller discharge nozzle, electric propulsion plants), the checking of main machinery during running trials may be omitted.</p> <p>5. In case of emergency stop during testing, the continuation or repeating of the test conditions shall be decided by the surveyor proceeding from the nature and cause of the emergency stop in each case.</p> <p>6. Upon completion of running trials the inspection of particular units and components shall be carried out, the necessity and extent of the inspection shall be determined by the surveyor. The necessity of control tests and their duration after the inspection shall be determined by the surveyor.</p>	

7.2.3.8 The engines shall be operationally tested complete with couplings and reduction gear, manoeuvring, starting and protecting devices, service pumps and compressors (including stand-by ones), heat exchangers, pressure vessels, systems, piping and equipment.

7.2.3.9 When the main engines are operationally tested, their principal service characteristics shall be checked including speed, maximum combustion pressure and compression pressure (for prescribed conditions), exhaust gas temperature, lubricating oil and cooling water temperature, etc.

Where necessary, the surveyor may require for main engine power to be determined during running trials. Cylinder load control is recommended. Reversing arrangements and reversing time shall be checked. Engines operating via reverse-reduction gear, hydraulic and electromagnetic couplings shall be operationally tested together with the above machinery, and with the reversing arrangements working as well.

7.2.3.10 The limit switches of engines driving propellers via reverse-reduction gear, hydraulic couplings of CPP-driving engines, as well as of the engines of main and auxiliary generators, shall be checked for tripping.

7.2.3.11 The protection and alarm systems of engines shall be checked while the engines are tested. This check may be carried out by simulating the conditions, under which the protection and signalling devices are activated.

7.2.3.12 The starting, shutdown, reversing and changing the operating conditions of remotely controlled engines shall be checked from local and remote control station. Simultaneously, the operation of the interlocking between the local and remote control station, the work of instruments and the transfer of control functions from one station to another shall be checked. The operation of the interlocking shall be checked under conditions of the shaft-turning gear being activated.

7.2.3.13 Engines with direct transmission to propellers shall be operationally tested at the minimum stable speed.

7.2.3.14 When operationally tested, auxiliary engines shall be tested in accordance with their purpose at specification speed and with other parameters as specified.

7.2.3.15 The communication efficiency between the navigation bridge and main machinery control room shall be checked.

7.2.3.16 Engines shall not be found fit for service if the operational testing reveals the following:

- abnormally high engine vibration;
- hammering and noise above normal;
- incorrect load distribution among cylinders;
- excessive heating of bearings;
- lubricating oil and cooling water temperature exceeding maximum permissible values stated in the engine manufacturers' instructions;
- exhaust gas temperatures exceeding maximum permissible values stated in the engine manufacturers' instructions;
- crankcase blow-by;
- malfunction of manoeuvring and starting devices, speed governors, limit switches, fuel injection equipment and safety valves;
- malfunction of auxiliary machinery servicing the engines and driven by them;
- malfunction of indicating and measuring instruments.

The causes of the above malfunctions shall be found and the deficiencies shall be eliminated.

Where abnormally high engine vibration is found, its parameters shall be measured in order to be assessed on the basis of technical standards and in order measures for vibration reduction could be worked out and implemented.

When assessing the wear of units and components of the internal combustion engines and determining permissible clearances for the units, technical documentation and manufacturers' machinery maintenance manual shall be applied, as well as the approved standards.

7.2.4 Recommendations on survey of internal combustion engines.

7.2.4.1 When carrying out surveys of main and auxiliary internal combustion engines the following instructions and recommendations on thorough examination, measurements of clearances and wear of units and components are given below:

.1 when examining the cylinder liners and blocks, the condition of their surfaces shall be assessed. The examination may be carried out through inspection holes in the block. Where it is impracticable, or a more thorough examination of the cylinder liner and block surfaces is needed, one of the liners shall be extracted on the surveyor's request. Where substantial corrosive attack and/or cracking, which affect strength, are/is visible on the liner or block surface, all the liners shall be extracted and examined. In examination, emphasis shall be placed upon the detection of cracks in way of the top nave collar of the liners, in way of the exhaust ports, on the stiffening ribs and block seats.

When necessary, the surveyor may demand a non-destructive testing of suspect areas using one of the approved methods. The cylinder block complete with the cylinder liners shall undergo a hydraulic leak test. The test pressure shall be taken equal to the working one in the cooling system;

.2 when examining cylinder covers, and suction and exhaust valves, it shall be examined the condition of bearing surfaces, fastening studs, fuel injector seats, starting air valves and other fittings, valve seats, surfaces on the side of displacement, water cooling passage and anodic corrosion protection (if sea water cooling is used). Covers shall undergo a hydraulic leak test;

.3 when examining the pistons, the condition of cylindrical surface, piston heads and piston ring grooves shall be checked. Where necessary, testing for defects is used;

.4 when examining gudgeon pins and crosshead pins, the condition of working surface, pin fit tightness and locking devices shall be checked;

.5 when examining the piston rods and their stuffing boxes, the condition of working surface shall be checked and measurements shall be made;

.6 when examining the connecting rods, it shall be checked that they are free of nicks and cracks, especially in areas of the maximum stress concentration (transition of the rod to the top end and to the bottom end), as well as in way of the toothed joint of the connecting rod bottom-end. The condition of antifriction lining of crank, connecting rod and main bearings or shells shall be checked.

For the connecting rods with thin-walled shells of connecting rod bearings, which have the toothed joint of the bottom end, the seat geometry of the connecting rod bearing seat and interference thereof shall be checked, the toothed joint shall be tested for defects and checked for contact by blueing.

For engines having over 50000 running hours or on the surveyor's request, as well as with due regard for the manufacturer's recommendations, the toothed joint of the connecting rod bottom end shall be checked using an approved method of non-destructive testing;

.7 when examining connecting rod bolts, the condition of mounting surfaces and tread depression of the "bolt — nut" pair, bolt fit tightness, the fit of nuts and heads to bearing surfaces, locking devices and bolts elongation shall be checked.

Close-up survey of the connecting rod bolts shall be necessary where scoring of the "piston — liner" pair took place and the engine operated at a speed, which exceeded significantly the rated one.

Connecting rod bolts shall be replaced after the expiry of the operational period in accordance with manufacturer's manual or after 20000 running hours if the data on their elongation is unavailable.

The connecting rod bolts of four-stroke engines and of the crossheads of two-stroke double-acting engines shall be checked for residual elongation or by means of flaw inspection in the following cases:

in accordance with the engine manufacturer's recommendations and maintenance manual;

after 20000 running hours of connecting rod bolts service;

in questionable cases.

For low-speed engines with the number of revolutions $< 250 \text{ min}^{-1}$, the measurements of the connecting rod bolts may be omitted during the first special survey in the following cases:

the relevant documents shall be demonstrated to the effect that all preventive and scheduled routine maintenance prescribed by the operation manual and the Rules for the Technical Operation has been carried out within the specified time;

the control test results shall evidence that the engines are in good working order.

The shipowner shall submit a relevant report on the control test results to the surveyor;

.8 when examining the crankshafts, the condition of the working surfaces of crank pins and journals, of the working and non-working surfaces of the crankshaft, the fitting of crank pins and main journals in built-up crankshafts against center-pops and marks shall be checked, as well as the condition of crank webs. Where needed, the condition of crank pins and main journals shall be checked with the use of kerosene and chalk test or other approved methods of non-destructive testing.

Crank web deflections shall not exceed the limits specified by the manufacturer.

Where a heavy flywheel is mounted on the crankshaft as a balance weight, crank web deflection shall be measured taking into account the flywheel effect. In all cases, the fit of all main journals to lower bearing shells shall be ensured;

.9 the condition of balance weight fixation on crankshafts and engine flywheel shall be checked.

Fixation and torsional vibration damper condition and antivibrators shall be checked.

The condition of dampers shall be assessed in accordance with the operation manual and/or with due regard for the following:

where necessary, the serviceability of spring dampers shall be restored by replenishment or replacement of a set of worn-out (failed) springs corresponding to those being replaced. No additional investigations needed after restoration;

the serviceability of viscous dampers with the expired service life specified by the manufacturer shall be determined in accordance with the Procedure for Diagnosing and Determining the Residual Lifetime of Silicone Dampers of Marine Internal Combustion Engines (refer to Annex 38 to the Guidelines on Technical Supervision of Ships in Service) or is evidenced by submitting the documented results of the previous control test. In so doing, the recommendations on the dates of follow-up tests or the replacement of dampers shall be taken into account.

Where check is carried out using alternative diagnosing methods (without assessing the residual lifetime), the dampers, which condition has been considered as good, are allowed for further use with checking at the next special survey.

After repairs or replacement of a faulty damper or an antivibrator with their modifications essentially affecting their damping or elastic and mass characteristics, as well as after the damper removal (running without a damper), jamming or release of an internal ring, torsional vibration shall be measured. In this case, if the damper is adjusted to motor oscillations, measurements may be carried out with the shafting disengaged or with CPP at zero pitch, whichever is appropriate.

The renovation (repairs) of dampers and antivibrators shall be carried out by the Register-recognized firm (manufacturer) according to the approved technical documentation (with the exception of the standard set of springs according to the manufacturer's manual);

.10 when examining main, bottom-end and top-end bearings, it shall be checked the adherence and thickness of antifriction lining (for thin-walled multilayer bearing shells, it shall be additionally checked an interference according to the specifications for engine repairs or the manufacturer's manual), the condition of the working surface, fillets, cooling slots, oil grooves and channels, locking devices preventing shells from turning, as well as the fit of bearings to their seats. The fit of main journals shall be checked by rolling the shells out upon the agreement with the surveyor to the Register and, if necessary, when the crankshaft is lifted. Isolated cracks of babbit shell lining (except for closed cracks), provided that the flaking and detachment of babbit are lacking, may, at the surveyor's discretion, be ignored and the bearings may be accepted for further use.

Bearings with local detachment of lining layer in way of cooling slots may, at the surveyor's discretion, be accepted for further use;

.11 when examining parallel guides and sliders, the condition of working surfaces, oil grooves and channels and the thickness of the antifriction lining shall be checked;

.12 when examining a camshaft and its bearings, the condition of the working surfaces of bearings and shaft journals, the fit tightness and the condition of the working surfaces of cam plates and rollers shall be

checked. If the camshaft is of built-up type, the condition of the shaft body in way of coupling shall be checked by one of the approved methods of non-destructive testing;

.13 when examining the camshaft and attached machinery gear, the condition of the working surfaces of teeth and their run-in shall be checked; as applied to a chain gear, it shall be checked the condition of the working surfaces of chain rollers and sprocket teeth, and the condition of chain links, as well as the chain elongation;

.14 when examining exhaust-gas turbochargers, the condition of the turbine and compressor casing components, nozzle diaphragm, rotor, turbine and compressor impellers, turbine blades, blade attachments, journal bearings, journal-and-thrust bearings, diffusers and labyrinth seals shall be checked. The position of the rotor, its axial float, the axial and diameter clearances of essential components shall be checked in accordance with the manufacturers' manuals and submitted to the surveyor in the form of measurement sheets and tables.

When examining the exhaust-gas turbocharger blades to detect cracks, in questionable cases, it is checked by an approved method of non-destructive testing.

The piston scavenging pumps shall be subject to an examination of their cylinders, pistons, rods, valves and drives; the rotary scavenging pumps shall be subject to an examination of their casings, rotors, seals, drives, synchronizers, bearings and reversing dampers;

.15 when examining bed plates, tie rods, frames (columns) and crankcases, it shall be checked for lack of cracks, joint leakages, loosening of bolts and foundation chocks and the condition of absorbers. If necessary, the surveyor may require a non-destructive testing of suspect areas using one of the approved methods.

Tightening of tie rods shall be checked against the manufacturer's standards;

.16 the setting of safety valves mounted on engines (on crankcase inspection holes, charging air receivers, on a manifold supplying starting air from the master starting valves to the cylinder starting valves, on cylinder covers, high pressure fuel-oil pumps) shall be checked on a test bench. The setting check results shall be submitted to the surveyor;

.17 when examining the telescope or hinged joints of the piston cooling system, particular emphasis shall be placed upon the condition of interacting surfaces.

7.3 GEARS AND COUPLINGS

This Chapter sets the requirements for tooth gears, reduction gears, rigid, elastic, hydraulic and electromagnetic couplings, as well as for other types of gears and disengaging couplings and coupling boxes.

7.3.1 Initial survey.

7.3.1.1 During initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), the compliance of gear and coupling design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering ships in service, shall be verified.

Technical condition of gears and couplings shall be checked regarding the quality of their manufacture, and also in order to detect any defects (wear, damage, failures) during the operational testing, to check their readiness for use and serviceability.

Disassembly may be omitted provided the classification certificate issued by a recognized ACS is available, as well as in case where, upon results of operational testing and available measurement data, no doubts arise concerning the technical condition of gears and/or couplings.

7.3.1.2 Survey of gears and couplings during initial survey of the ship in service shall be carried out in the scope of special survey.

7.3.2 Intermediate survey.

7.3.2.1 The summarized scope of gears and couplings surveys during intermediate surveys of ships is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

7.3.2.2 During intermediate survey, the gears and couplings shall be submitted for external examination and operational testing together with the engines these gears and couplings belong to.

7.3.2.3 When assessing the technical condition of reduction gears, gears and couplings, the provisions specified in 7.3.3.5 and 7.3.3.8 shall be taken into account.

7.3.3 Special survey.

7.3.3.1 The summarized scope of gears and couplings surveys during special surveys is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

7.3.3.2 During special survey, the gears, reduction gears, reverse-reduction gears and couplings shall be submitted for thorough examination with casings being opened up and units and components dismantled, where necessary.

7.3.3.3 The following parts and units of gears and reduction gears shall be surveyed: casings, foundation bolts and wedges, shafts and bearings, pinions and gear wheels, ahead and astern running couplings or astern and ahead running mechanisms (for reverse-reduction gears), lubricating oil pumps driven by tooth gears of reduction gears (if such pumps are fitted), control systems.

Proceeding from the coupling purpose and design, its casing, connecting bolts, control system, as well as units and components accessible for dismantling and those appropriate to be fully examined shall be surveyed.

These units and components include:

for connecting rigid, semi-rigid, movable and elastic and also friction couplings, intermediate metal bars, plates, cylindrical and leaf springs, intermediate components of rubber and other non-metal materials, elastic elements of different types, packs of driving and driven steel discs, cylindrical pins of half-couplings;

for tooth and tooth-spring type couplings, tooth half-couplings with inner teeth, liners with outer teeth; and besides, for tooth-spring type couplings, elastic spring elements also;

for connecting/disengaging couplings of cam and tooth types, cams, gear wheels, pinions, synchronizers (if any); and besides, for tooth-type couplings, spring elements also;

for hydraulic couplings, pump and turbine rotors (impellers), shafts and bearings, hydraulic units and systems, regulating systems, shut-off, diaphragm, spring valves;

for electromagnetic connecting and connecting/disengaging couplings, electromagnetic units, friction units and gear wheels (if any).

To determine dismantling and survey extent for reduction gears and couplings, the manufacturer's technical documentation and maintenance manuals for reduction gears and couplings shall be considered.

Instructions and recommendations on survey of the above mentioned components and units of gearings, reduction gears and couplings and their operational testing are set forth in 7.3.4.

7.3.3.4 During the survey, the following shall be submitted to the surveyor: measurement results and wear assessment of shaft working journals, carrier and thrust bearing clearances, radial clearances of gear wheel and pinion teeth, coupling and slit disc teeth, clearance in components of lubricating oil and hydraulics driving pumps, in liners, between pinions and covers, between pinion teeth.

Where necessary, the surveyor may require for measurements of other units and components to be carried out depending upon manufacturer's maintenance manuals for tooth gears, reduction gears and couplings.

7.3.3.5 Repairs or replacement of units and components of tooth gears, reduction gears and couplings shall be carried out if dangerous defects and wears exceeding maximum allowable limits have been detected in the course of the survey.

These defects include:

.1 damage to essential units and components:

cracks of casings of tooth gears, reduction gears and couplings;

cracks and deformation (round-up) of driving and driven shafts, scuffing and galling of shaft working journals;

fusion, flaking, cracks, destruction of sleeve bearing antifriction lining;

cracks, corrosion, dents, signs of overheating on the working surfaces of outer and inner races, separators, balls and rollers of roller bearings;

roller bearing jams;

uneven galling of disc working surfaces of friction type couplings, disc warping and scuffing, destruction of coupling springs;

crumpling, scuffing of cams and teeth working surfaces of movable couplings, break of springs, deterioration of elastic coupling teeth, crumpling of slit slots in connecting/disengaging couplings;

defects of coupling intermediate components preventing couplings from normal operation, defects of elastic elements of different types of couplings;

corrosion and cavitation of rotors and impellers of hydraulic couplings, defects of valves, units and hydraulic system;

defects of electromagnetic units, friction units, control systems of electromagnetic couplings;

.2 wear of essential units and components:

wear, galling of working journals of driving and driven shafts, ellipticity and conicity exceeding allowable limits;

wear of sleeve bearings, reduction of antifriction lining thickness of bearings exceeding allowable limits, increase of bearing clearances exceeding allowable limits;

galling of roller bearing slots;

expiration of roller bearing service life specified in the manufacturer's technical documentation and maintenance manual;

teeth wear, increase of teeth clearances of wheels or pinions exceeding maximum allowable limits;

wear of essential units and components of lubricating oil pumps driven by tooth gears;

increase of clearances in liners, between pinions and covers, between pinion teeth (for gear pumps) exceeding maximum allowable limits;

wear of cams and teeth working surfaces, wear of friction discs and plates of couplings of various types;

.3 defects of individual units and components:

defects of lubricating oil systems of pinions and gear wheels, shaft bearings of tooth gears, reduction gears and couplings;

defects of hydraulic systems and pumps of hydraulic couplings;
improper adjoining of shaft journals to sleeve bearings;
loosening of shaft roller bearing slots;
loosening of half-coupling fit on shafts;
non-compactness of casing slits of tooth gears, reduction gears and hydraulic couplings.

Besides, where other units and components reveal damages, wear and defects, which prevent tooth gears, reduction gears and couplings from proper performing their functions, such units and components shall be repaired or replaced.

7.3.3.6 After completion of special survey and elimination of defects, the gears, reduction gears and couplings shall be submitted for operational testing together with the engines they belong to.

7.3.3.7 When gears, reduction gears and couplings are operationally tested, attention shall be paid to the fact that these mechanisms have no abnormal slaps and strikes, abnormal noises, abnormal casing and bearing heating exceeding those limits specified in the manufacturers' machinery maintenance manuals and that there are no oil leakages in flanged connections and seals.

7.3.3.8 Gears, reduction gears and couplings shall not be found fit for service if the operational testing reveals the following:

- abnormal strikes, slaps and noises in gears, reduction gears and couplings;
- bearing overheating, abnormal lubricating oil temperature increase (in comparison with specification temperature parameters for bearings and lubricating oil);
- abnormal vibration of gears and reduction gears.

Causes of the above mentioned defects shall be detected and the defects shall be eliminated.

If abnormal vibration of gears and reduction gears is found, its parameters shall be measured for assessment against technical standards and for development and implementation of vibration reduction measures.

7.3.3.9 For wear assessment of units and components of gears, reduction gears and couplings, for clearance assessment and other parameters, the manufacturers' technical documentation and maintenance manuals for the above machinery shall be used.

7.3.4 Recommendations on survey of gears and couplings.

7.3.4.1 When carrying out surveys of gears and couplings, the following instructions and recommendations on thorough examination, measurements of clearances and wear of units and components are given below:

.1 when surveying the casings of tooth gears, reduction gears and couplings, it shall be checked the condition of fastening to foundations (for couplings, such check depends on their design and type), the tightness of gasket (wedged) fit and the tension of foundation fastening bolts;

.2 where the defects evidencing a deformation (deflection) of shafts are detected during survey of tooth gears, reduction gears and couplings (where the latter are fitted with shafts according to their design), they shall be checked on a balancing machine and the defects shall be eliminated;

.3 the condition of the working surfaces of gear wheels and pinions, and the tooth (gear) contact shall be checked. For ahead gear wheels, fitness shall make up at least 90 % longways and at least 60 % breadthways of an active profile, and for astern gear wheels, fitness shall make up at least 80 % longways and at least 50 % breadthways of an active profile. Where the fitness is unsatisfactory, position of gear wheels and pinions shall be checked. Gapping of tooth meshes shall also be checked. When assessing the tooth (gear) contact (fitness) and the gapping of meshes, the recommendations and standards specified in the manufacturer's technical documentation and maintenance manuals shall also be followed;

.4 minor defects of the working surfaces of teeth, such as shallow scratches, fine dents and shallow pitting (non-propagating), the isolated cracks on the babbitting (other than the closed cracks) when no babbit flaking and spalling exists, as well as when local separation of the lining layer takes place in way of the cooling grooves, the minor defects not affecting coupling performance may be ignored and the gearings and/or couplings may be accepted for further operation;

.5 when surveying the composite constructions of gear wheels and other essential gear elements, the condition of their fastening and locking, the fit tightness of component parts, as well as absence of cracks therein and in welds shall be checked. Performance of lubricating oil system of gear wheels and pinions shall also be checked;

.6 the condition of the working surfaces of sleeve bearings and their fit tightness to seats shall be checked. To be checked is the condition of roller bearings. These latter shall be replaced when their service life specified in the maintenance manual expires;

.7 when surveying couplings, the fit of half-couplings on shafts and of connecting bolts in holes shall be checked; for dismantled couplings (depending on a coupling type), the working surfaces of cams, the intermediate components, elastic elements, packs of steel discs, tooth-half-couplings and liners, gear wheels and pinions, spring elements shall be examined; when surveying hydraulic couplings, the pump and turbine rotors, shafts, bearings, hydraulic units, valves shall be checked. For dismantled electromagnetic couplings, the electromagnetic units, friction units and gear wheels shall be examined;

.8 when examining the lubricating oil system of gears and couplings, emphasis shall be placed upon the nature of filter clogging.

7.4 SHAFTING AND PROPELLER

This Chapter sets the requirements for shafting, sterntube with bearings, lubricating oil system and seals, propeller, pitch control units and spare parts.

7.4.1 Initial survey.

7.4.1.1 During initial survey of a ship in service (refer to 3.2, Part I "General Provisions") the compliance of shafting and propeller design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering ships in service, shall be verified.

Survey of shafting and propellers during initial survey of ship shall be carried out in the scope of special survey and consists of thorough examination, checks, measurements and testing, which extent is determined subject to the age of ship, its technical condition and availability of technical documentation.

The extent of opening-up of shafting and propeller units may be reduced, or may be omitted provided the classification certificate issued by a recognized ACS is available, and if upon results of external examination, measurements of clearances in bearings and operational testing no doubts arise concerning their technical condition.

7.4.1.2 Technical condition of shafting and propellers shall be checked regarding the quality of their manufacture, and, also in order to detect any defects (wear, damage, failures) during the operational testing in the course of running trials together with the main machinery (refer to 7.2.3.7), and to check their readiness for use and serviceability.

7.4.2 Intermediate survey.

7.4.2.1 The summarized scope of intermediate survey of shafting and propellers is given in Table 1.3. Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

Schedule of surveys of the outside of the ship's bottom is given in 4.3, Part I "General Provisions".

7.4.2.2 During intermediate survey of ship (with docking), the propeller shaft, sterntube, sealings fitted to the cone of propeller shaft and propeller shall be thoroughly examined as during special survey (refer to 7.4.3). Sealing fitted to the cone of propeller shaft shall be tested for tightness (refer to 7.4.3.5). During this survey, axial clearances in the thrust bearing shall be measured.

Operational testing of shafting may be omitted but, where necessary, it may be demanded.

During each survey of ship in a dry dock, the propeller shall be examined with non-destructive testing of blades, propeller boss sealing, sterntube attachment, protective shaft housing attachment, bushes and, in case of oil lubrication, sterntube sealing attachments.

Oil lubricated sterntube bearing sealing, as well as CPP shall be tested for tightness by oil pressure from inside, and along with that, sterntube bearing clearances, tightening of the fixed-pitch propeller nut, attachment of CPP blades and detachable-blade propellers shall be checked.

Checking of securing items tightness is not required in the absence of damages to locking items.

7.4.2.3 During each intermediate survey (without docking), the shafting shall be examined in accessible locations, shafting alignment shall be checked (where propeller shafts are extracted and proceeding from the size of clearances in sterntube bearings), axial clearance shall be measured, as far as practicable, having regard to structural features of the shafting; the sterntube gland shall be examined externally; visible sections of propeller shall be examined with non-destructive testing of blades, examination shall be carried out of the cone seal and propeller shaft flange housing, sterntube and protective (antirope) shaft housing, sterntube sealing, and the threaded connections of propeller components and sterntube arrangement shall be checked for reliability of their locking; the control system of CPP and cooling and lubricating systems of propeller shaft bearings shall be examined externally and operationally tested.

7.4.2.4 In case where the system for monitoring the propeller shaft condition is implemented on board the ship, the surveyor shall evaluate measurement and analysis results in accordance with 7.4.3.7.3 and

having regard to the provisions specified in Annex 13 to the Guidelines on Technical Supervision of Ships in Service.

7.4.3 Special survey.

7.4.3.1 The summarized scope of shafting and propellers survey during special surveys of ships is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

Schedule of surveys of the outside of the ship's bottom is given in 4.3, Part I "General Provisions".

7.4.3.2 Special surveys of shafting and propellers covers survey of thrust, intermediate, propeller (stern) shafts, sterntube arrangements and propellers.

7.4.3.3 During special survey, the shafting shall be submitted for through examination and measurements of wear and clearances with opening-up of shafting bearings, removal of propeller and extraction of propeller shaft from the sterntube. The CPP boss shall be opened up.

7.4.3.4 Measurement results of the intermediate shaft working journals, thrust collars and axial clearances in thrust bearing, clearances in stern tube and strut bearings, as well as axis breaks and floats between the flanges of the propeller shaft and the latest intermediate shaft (or data obtained by another approved method for checking alignment) shall be submitted to the surveyor. If a shaft alignment is carried out by shaft axis breaks and floats, connection with propeller (sterntube) shaft shall be unscrewed before the ship is docked. Screwing of this connection after the docking is completed shall be carried out afloat. Break and float of this connection shall be checked before and after the docking.

7.4.3.5 When carrying out special surveys the following types of propeller (sterntube) shafts surveys may be used:

.1 overall survey of the Register approved structures of oil lubricated propeller (sterntube) shafts, shafts with continuous liner or made of corrosion-resistant materials, carried out once in 6 years.

Intervals between overall surveys of propeller (sterntube) shafts of design different from those listed above shall not exceed 3 years (\pm 9 months).

For ships engaged in ice-breaking operations, the propeller shaft shall be extracted at least once in 3 years in case of single-shaft ships and at least once in 4 years in case of multi-shaft ships.

When considering extension of the intervals between overall surveys attention shall be given not only to the absolute level of monitored parameters, but also to the trend of their alteration;

.2 modified survey for oil lubricated shafts. The interval between overall surveys may be extended to: up to 9 years, provided the partial survey is carried out;

up to 12 years, provided the partial survey is carried out and the propeller shaft condition monitoring (PCM) system is implemented. Use of the PCM system shall be recorded in the Report on Survey in Dock of Propeller Shaft, Sterntube, Propeller and Bottom and Side Fittings and in the Classification Certificate.

7.4.3.6 The overall survey of the propeller (sterntube) shafts shall be carried out with the extraction thereof.

Shift of the shaft shall be considered as sufficient where shafts, bearings and sterntubes are accessible for external examination and measurements.

During overall survey, measurement of journals (liners), bearings, clearances and the sag shall be made. Tight fit of the lining and its residual thickness shall be checked. The end of shaft cylindrical part (from the stern end of liner, if any) and approximately 1/3 of the cone length (from the cone base), as well as flange key bed and flange fillet (if a sterntube or propeller shaft is connected with propeller by flange) shall be checked for cracks using the approved methods of testing for defects. Seals shall be surveyed (replaced, where necessary) and pressurized in accordance with the manufacturer's recommendations.

7.4.3.7 Modified survey may be carried out on the shipowner's request instead of overall survey.

For single and multi-shaft plants such surveys may be carried out, provided the following conditions are met:

.1 keyed joints of propeller with propeller shaft, or flanged joints of propeller or keyless joints of propeller with propeller shaft are used.

Meanwhile:

closed oil lubricating system is used;

shaft and joints are not liable to corrosion;

new seals may be fitted without removal of the propeller (except the case of keyed joint of propeller with shaft);

design is approved and meets the Register requirements;

clearances in aft bearing are up to standards and seals have proven their efficiency;

.2 during modified survey the following shall be carried out:

shift of shaft for examination of its surface contacting with aft bearing;

survey, as far as possible, of bow bearing and all accessible parts of the shaft including connection of propeller with shaft;

testing for defects of shaft cone approximately at 1/3 of the cone length from the cone base and key bed for cracks, as well as of the shaft fillet.

Shift of the shaft for examination of its surface contacting with aft bearing may not be required during modified survey, provided the PCM system is used on board and all its provisions are met, namely:

oil analysis is carried out on a regular basis at intervals not exceeding 6 months, and oil specimens were sampled during operation;

oil consumption and bearing temperature were registered and remained within allowable limits.

Documentation on oil analysis shall be submitted. As a minimum, each analysis shall include the following parameters: contents of water, chlorides, metal particles and oil ageing (oxidation). Stern seals shall be checked for tightness.

7.4.3.8 Partial survey involves survey of the end of shaft cylindrical portion and approximately at 1/3 of the cone length from the cone base, key bed and flange fillet using approved methods of testing for defects. Along with that, data on clearance measurements and shaft sag shall be submitted. Oil seals shall be surveyed and subjected to pressure test.

7.4.3.9 Recommendations on survey of shafting are given in 7.4.4.

7.4.3.10 Controllable pitch and vertical-axis propellers shall be submitted for special survey in dismantled condition with measurements being presented, unless expressly provided otherwise in other standards agreed upon with the Register.

During special surveys, starting from the second special survey, feedback rods of the pitch control unit shall be tested for defects.

It is allowed not to dismantle CPP boss during the first special survey. If necessary, bearings of blade assemblies shall be partially dismantled and examined to the extent sufficient for assessment of the general technical condition of the propeller proceeding from its design.

7.4.3.11 In fixed pitch propellers with detachable blades, mating surfaces of boss and blades shall be examined. If necessary, their gapping may be checked.

7.4.3.12 Propeller and blade securing bolts (studs) shall be surveyed using an approved method of testing for defects to detect cracks. Permanent elongation of bolts shall be checked with consideration of the manufacturer's recommendations.

7.4.3.13 Blades shall be thoroughly examined for crack detection in the zone *A* using an approved method of testing for defects at each ship docking. Other zones shall be examined externally.

7.4.3.14 CPP shall be pressurized after assembly in accordance with the manufacturer's recommendations.

7.4.3.15 Overall survey of the main active means of the ship's steering shall be carried out at each special survey. Extension of the interval between overall surveys shall be considered by the Register in each particular case and depends on efficiency of the applied technical condition monitoring system for active means of the ship's steering, considering also the manufacturer's recommendations.

7.4.3.16 Recommendations on propeller survey are given in 7.4.4.

7.4.3.17 Repair or replacement of units and components of shafting and propellers shall be required, if defects exceeding the maximum permissible limits are found during survey.

These are the following defects:

.1 damages:

shaft cracking and bending;

cracks and honeycombs in sterntubes and bearing bushes;

damage to bearing strips or bearing lining;

excessive nicks, hairlines and roughness of shaft journals, liners and bearings;

cracks on liners and damage to the protective coating;

cracks on propeller blades and excessive bending of blades;

damage to sterntube arrangement seal details;

.2 excessive wear of shafts, liners, bearing strips or bearing lining, blades and bosses of propellers (including wear due to corrosion and erosion), details of sterntube bearing seal elements oil or water lubricated.

The maximum permissible operating clearance Δ between the propeller shaft and strips or between the propeller shaft and babbitting of the sterntube seal shall not exceed the following values:

when bearing strips are manufactured from lignum vitae, rubber, textolite, resin-bonded chipboard, caprolon:

$$\Delta = 0,012d + 1,8 \text{ mm, for shaft diameter 600 mm and less;}$$

$$\Delta = 0,005d + 6,0 \text{ mm, for shaft diameter more than 600 mm;}$$

babbitting:

$$\Delta = 0,005d + 1,0 \text{ in mm}$$

where d = shaft diameter over the liner, in mm.

The minimum thickness t of the bronze liner of propeller shaft in the working areas (in way of the stern bearings and glands) permitted during operation shall not be less than that calculated by the formula:

$$t = 0,02d_p + 5,0 \text{ in mm}$$

where d_p = shaft diameter under the liner, in mm;

.3 shafting misalignment, breaking the fit tightness of the sterntubes, bushes, liners, connecting couplings and propeller.

Recommendations on technical supervision during repair of shafting and propeller components are set forth in the relevant Annexes to the Guidelines on Technical Supervision during Repair of Sea-Going Ships.

7.4.3.18 After completion of special survey and elimination of defects, the operational testing of shafting and propeller shall be carried out during operational testing of main machinery.

Where necessary, special operational testing of shafting and propeller may be demanded proceeding from their technical condition and extent of repair.

7.4.3.19 During CPP testing, operational testing of the pitch control unit and control system (from all control stations) shall be carried out.

7.4.3.20 Bearing temperature and sterntube bearing oil and water lubrication systems shall be checked during tests.

7.4.3.21 Shafting and propeller shall not be considered fit for service, if during operational testing the following findings were detected: excessive vibration, abnormal strokes, excessive heating of bearings, malfunctions of the lubricating system and pitch control unit.

Reasons for such malfunctions shall be identified and defects shall be eliminated.

7.4.3.22 During each dismantling, shafting alignment shall be performed using one of the methods approved by the Register.

Necessity for the static balancing of propellers after repair is established proceeding from the scope of replacement of blade parts or welding deposition considering results of survey and information on the shafting operation.

7.4.4 Recommendations on survey of shafting and propellers.

Additional instructions and recommendations on performance of examinations and tests of some units and components of shafting and propellers are as follows:

.1 when examining the thrust, intermediate and propeller shafts, the condition of journals and thrust collars shall be checked.

The tightness of the shaft liner fit shall be checked (by a hammering test), as well as the condition of the protective shaft covering between the liner portions.

Where a loose shaft liner fit or disturbance to the protective shaft covering coating is detected, the defective spots shall be opened for examination of the shaft surface beneath.

Shaft parts in way of openings and cutouts, keyways, propeller shaft cone, flange fillets and end edges of the propeller shaft liners shall be thoroughly examined. Where necessary, a non-destructive testing of the propeller shaft cone using one of the approved methods may be required.

The condition of flange joints and shaft couplings shall be checked.

When examining the thrust and journal bearings, the condition of the shell white metal and thrust pads shall be checked. For roller bearings, it shall be checked the condition of races, ball, rollers and cages. Shims shall be examined and the tightening of bearing anchor bolts checked;

.2 when examining the sterntube, the condition of the sternbush and strut bearing strips, and stern gland components shall be checked including the attachment of the sterntube and bushes.

Where the indications of bearing strips slackening, tube and bushes sagging are identified, the defects shall be eliminated.

For oil-lubricated bearings, the condition of the white metal, sealing collars and guide bushes, springs and fasteners shall be checked.

Once installed, the aft and forward seals shall be tested by pressure corresponding to the as-built data. During survey, the condition of piping, water flow indicators, and valves of the stern bearing water- or oil-lubricating system shall be checked;

.3 seals between the propeller shaft liner and the propeller boss, as well as on the side of the propeller cone shall be subjected to thorough examination; tightness of the sealing shall be tested by a pressure of 200 kPa;

.4 the propeller blades shall be checked for cracks within the zone *A* using dye penetrant of fluorescent testing, if the propeller are made of copper-base alloys, and using magnetic particle or penetrant testing, if propellers are made of steel. The remaining zones shall be subjected to external examination with use, in doubtful cases, magnifying glasses (with 50 x magnification) or the above testing for defects.

When a new or an existing (when the occasion requires) propeller is mounted, its fitting to the propeller shaft cone and key, as well as the propeller nut tightening, securing and locking shall be checked.

When the propellers are mounted on the shafts in such a manner as to provide a controllable interference fit (including keyless fitting), the interference fit shall be checked for accuracy by marks or by axial shifts and forces keeping under control the interference fit margin for the mating parts.

Forces to be applied to tighten the bolts fastening blades to the boss, and the CPP boss to the propeller shaft flange shall comply with the provisions of drawings and instructions. The tightening forces shall be checked with a torque wrench or by other methods recommended by the manufacturer. The essential components of the CPP and vertical axis propellers are subject to thorough examination; the propeller bosses and vertical axis propeller casings shall be hydraulically tested (by a pressure as recommended by the manufacturer).

One of the detachable blades may be removed for checking the mating surfaces of the propeller boss and blade. Attaching bolts (studs) shall be checked with use of non-destructive testing. Where defects are detected, all the blades may be removed for checking all attaching bolts with use of non-destructive testing.

7.5 AUXILIARY MACHINERY

This Chapter sets the requirements for surveys of the following auxiliary machinery: pumps (circulating, boiler, bilge, cooling water, feed, ballast, fire, fuel oil, lubricating oil, condensate, cargo), steam jet ejectors of condensers, bilge ejectors, motors and pumps of hydraulic drives and hydraulic cylinders, centrifugal fuel and oil separators, air compressors with air coolers, fans of dangerous spaces, boiler blowers, turbochargers, steering gears, anchor and mooring machinery, machinery of launching appliances of boats and rafts, towing winches, stripping pumps and inert gas blowers of oil tankers.

Auxiliary machinery driven by main ICE (cooling water pumps, lubricating oil pumps, fuel oil booster pumps, bilge pumps, air compressors, etc.) shall be surveyed together with the main ICE.

7.5.1 Initial survey.

7.5.1.1 During initial survey of a ship in service (refer to 3.2, Part I "General Provisions") the compliance of auxiliary machinery design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering ships in service, shall be verified.

Survey of auxiliary machinery during initial survey of ship shall be carried out in the scope of special survey and consists of thorough examination, checks, measurements and testing, which extent is determined subject to the age of ship, its technical condition and availability of technical documentation.

The extent of opening-up of the auxiliary machinery units may be reduced, or may be omitted provided the classification certificate issued by a recognized ACS is available, and if upon results of external examination, measurements of clearances in bearings and operational testing no doubts arise concerning their technical condition.

7.5.1.2 Technical condition of auxiliary machinery shall be checked regarding the quality of its manufacture, and, also to detect any defects (wear, damage, failures) during the operational testing in the course of mooring/running trials, and to check its readiness for use and serviceability.

7.5.2 Intermediate survey.

7.5.2.1 The summarized scope of intermediate survey of auxiliary machinery during intermediate surveys of ships is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

7.5.2.2 During intermediate survey, the auxiliary machinery shall be subjected to operational testing (except for mooring machinery and towing winch) and to external examination.

7.5.2.3 Electrical equipment and automation devices forming part of the auxiliary machinery shall be surveyed in compliance with the requirements set forth in the relevant sections of this Part.

7.5.2.4 When assessing the technical condition of the auxiliary machinery, the wear and defect rates specified in 7.5.3.19 and 7.5.3.20 shall be considered.

7.5.3 Special survey.

7.5.3.1 The summarized scope of auxiliary machinery survey during special surveys of ships is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

7.5.3.2 During special survey, the auxiliary machinery shall be submitted for thorough examination with certain units being opened up and dismantled, where necessary, proceeding from the purpose and type of auxiliary machinery.

Upon the surveyor's request, measurement results and wear assessment of essential units and components shall be submitted during this survey.

7.5.3.3 The following shall be surveyed in piston pumps: cylinder blocks and cylinder covers, cylinders and cylinder liners, pistons with piston rings and rods, crankshafts, connecting rods with sliders, bearings, valve boxes, suction and forcing valves with springs and fenders, valve seats, reduction gears and

coupling boxes, safety valves; besides, in direct-acting steam pumps: steam cylinders and pistons with rods, cylinder covers and slide valve covers, slide valve chest, steam distribution slide valves, slide valve rods shall be surveyed.

7.5.3.4 In centrifugal pumps, fans, air blowers the following shall be surveyed: casings, casing covers, wheels (impellers), shafts with bearings, self-priming devices (in self-priming pumps), coupling boxes, safety valves, seals. The aforesaid applies also to peripheral, centrifugal-and-peripheral and axial flow pumps. During survey of these pumps, the manufacturer's technical documentation and pump maintenance manuals shall be considered.

7.5.3.5 For screw and gear pumps the following shall be surveyed: casings, casing covers, screws and screw pump housing (for screw pumps), shafts and pinions (for gear pumps), bearings, balance pistons of screw pumps (if any), safety-overflow valves, seals.

7.5.3.6 Ejector units and components accessible for examination shall be surveyed.

7.5.3.7 For motors and pumps of the hydraulic drive systems and hydraulic cylinders the following shall be surveyed: casings and covers, cylinders, plungers (plunger-and-barrel assembly), plunger bearing surfaces, seals, overflow valves, control and safety valves, pumps serving auxiliary systems (feed-water circuits, control system feeding, oil supply to hydraulic cylinders of brake drives, etc.). Recommendations to be found in the manufacturers' technical documentation and maintenance manuals for hydraulic sets shall also be considered.

7.5.3.8 In centrifugal fuel and lubricating oil separators, bowls, bowl components, discs, bowl shafts, pinions, friction couplings, locks shall be surveyed.

Bowl body and vertical shafts shall be tested by an approved method of non-destructive testing, the results of testing for defects shall be submitted to the surveyor.

7.5.3.9 Cylinder blocks, cylinders, cylinder liners, cylinder covers, pistons and piston rings, connecting rods, crankshafts, top-end (crank), connecting rod and main bearings; suction, forcing and safety valves, valve seats, springs shall be surveyed in piston air compressors.

Compressor air coolers shall be surveyed in accessible places.

7.5.3.10 For fans in dangerous spaces and boiler blowers the following shall be surveyed: casings, shafts, rotors (impellers), bearings.

Completeness of the above mentioned machinery shall be checked, as well as casing and impeller material compliance with the requirements of manufacturer's technical documentation or maintenance manuals.

7.5.3.11 The following units and components shall be surveyed in steering gears of various types:

electrical steering gears — tillers of main and emergency gears, rudder quadrants, rudder stock yokes or bearing rollers, couplings between electric motors and reduction gears, reduction gears, pinions, buffering spring compensators, limit switches and limiters, emergency (stand-by) gears with components;

electro-hydraulic steering gears — tillers, rods, cylinders of plunger hydraulic drives, plungers, pins for connecting plungers with rods, pumps of hydraulic drive, couplings (electric motors with pumps), hydraulic actuator, valve boxes, safety valves, feeding valves, pumps for leakage replenishment in the hydraulic system, packing seals, emergency (stand-by) steering gear, limit switches and other essential units and components proceeding from steering gear design.

Protection device and alarms (if any) shall be checked in the steering gears.

Survey of steam steering gears shall be carried out in compliance with the requirements applicable to the auxiliary steam engines.

Recommendations to be found in the manufacturer's technical documentation and maintenance manuals for steering gears shall be considered during survey of all types of steering gears including those not mentioned in this paragraph (for instance, vane-type steering gears).

7.5.3.12 In anchor machinery (anchor windlasses and capstans) the following shall be surveyed: shafts, spindles, bearings, gear wheels, pinions, sprockets, worm shafts and wheels, reduction gears, belt, electromagnetic and other brakes, connecting/disengaging couplings and sprocket switches, torque-limiting clutches (overload protection devices), foundation frames.

Survey of hydraulic drives (including hydraulic motors, pumps, accumulators, governors, valves, piping, etc.) of anchor machinery shall be carried out in accordance with 7.5.3.7.

Survey of these items in steam-driven anchor machinery shall be carried out in the scope of the auxiliary steam engine survey (refer to 7.5.3.3).

7.5.3.13 In mooring machinery (mooring capstans and winches) the following shall be surveyed: load shafts, spindles, drums, warping drums, bearings, gear wheels, worm shafts and pinions, reduction gears, belt and other brakes, connecting/disengaging couplings, friction couplings, torque-limiting clutches, overload protection devices, fairleads, foundation frames.

Survey of hydraulic drives and steam drives of mooring machinery shall be carried out in accordance with 7.5.3.7 and 7.5.3.12.

7.5.3.14 In machinery of launching appliances for boats and rafts the following shall be surveyed: shafts, drums, bearings, gear wheels and pinions of reduction gears, other gear and chain drives (if any), centrifugal, belt and other brakes, centrifugal couplings, coupling boxes, hand drives, locking arrangements preventing winches from spontaneous reverse rotation, limit switches, fairleads.

Boat winch hydraulic drives, if any, shall be surveyed in accordance with 7.5.3.7.

During survey of raft launching appliances, as well as boat launching appliances of other types not covered by the provisions of this paragraph, their units and components shall be examined according to instructions and recommendations set out in the manufacturers' technical documentation and maintenance manuals for these appliances.

7.5.3.15 In towing winches the following shall be surveyed: shafts, drums, bearings, gear wheels and pinions, reduction gears, brakes with spring shock absorbers, belt and other brakes, tooth-type couplings (connecting/disengaging), limit switches, fairleads with drive, automatic devices for governing the towline tension, foundation frames (plates).

Hydraulic drives of winches shall be surveyed in accordance with 7.5.3.7.

7.5.3.16 Instructions and recommendations on survey of units and components of auxiliary machinery are given in 7.5.4.

7.5.3.17 Operational testing of auxiliary machinery shall be carried out simultaneously with operational testing of machinery, arrangements and systems served by it.

During operational testing of auxiliary machinery, its basic performance characteristics shall be checked with regard to the purpose of this machinery.

List of parameters and characteristics to be checked, as well as duration of the auxiliary machinery operational testing shall be agreed upon with the surveyor.

7.5.3.18 Protection and alarm systems of auxiliary machinery shall be checked. Such check may be carried out by simulation of activation conditions for protection and alarm systems.

7.5.3.19 Repair or replacement of auxiliary machinery units and components shall be carried out if dangerous defects and wear exceeding maximum allowable limits have been detected during survey.

Among these defects are the following damages, wears and malfunctions:

.1 for pumps:

cracks on casings, covers, pistons, impellers, screws, pinions, shafts;

scuffing of cylinders, pump casings and housings;

touch of pump casings and screw housings by impellers, screws and pinions;

hard starting of pumps;

pump seizing;

pump casing vibration due to wear of bearings, misalignment between pumps and electric motors;

unbalance in impellers of centrifugal pumps;

crumpling and cut of keys fixing impellers and pinions on shafts of screw and gear pumps, loosening of keys in keyways (key beds);

clearance increase between screws and housings, between pinion teeth of screw and gear pumps exceeding maximum allowable limits, wear or breakage of piston rings of piston pumps;

wear of shaft journals, wear and damage of sleeve bearings, wear and damage of roller bearings, wear of seats for roller bearings on shafts;

clearance increase in sleeve bearings exceeding maximum allowable limits;

expiration of service life of roller bearing;

low pump capacity due to wear of units and components;

wear of coupling boxes;

.2 for motors and pumps of hydraulic drive systems;

significant internal leakages in hydraulic motors and pumps;

wear of plunger-barrel assemblies (precision pairs) of hydraulic motors and hydraulic pumps;

.3 for fuel and lubricating oil centrifugal separators:

separator casing vibration;

damage to bowls and shafts;

damage to worm shafts and worm pinions of reduction gears;

wear or damage of friction couplings;

.4 for piston air compressors:

compressor casing vibration;

loss of capacity and compression pressure drop due to wear of cylinder and piston groups, damage to valves, break of valve springs;

.5 for hydraulic steering gears (refer also to the respective defects listed in 7.5.3.19.1, 7.5.3.19.2 and 7.5.3.19.6):

break of plunger seals in power cylinders;

failure of putting the rudder over due to valve defects, faults of hydraulic pimps, steering gear misalignment;

oil leakage from hydraulic system;

galling of coupling boxes;

.6 for anchor and mooring machinery, towing winches, boat winches (refer also to the respective defects listed in 7.5.3.19.1 and 7.5.3.19.5):

chipping and damage of worm pinions, damage to worm shafts of reduction gears, chipping of teeth of gear wheels, pinions, progressing pitting of gear wheels and pinions teeth of cylindrical gearing;

oil leakage through contacting surfaces of reduction gear casings;

wear of belt brakes;

galling of coupling boxes.

Survey of hydraulic anchor, mooring machinery, towing, boat winches shall be carried out in accordance with 7.5.3.2.

Besides, where units and components reveal damages, wear and defects, which prevent auxiliary machinery from proper performing its functions, such units and components shall be replaced or repaired.

Manufacturer's recommendations to be found in technical documentation and machinery maintenance manuals shall be considered during assessment of contact (fit) of teeth of gear wheels, pinions, worm shafts and worm pinions and at assessment of clearances.

7.5.3.20 Auxiliary machinery shall not be considered as fit for service, if the operational testing reveals the following:

service parameters and characteristics do not comply with those given in specification;

abnormal machinery vibration;

abnormal strikes, slaps and noises in machinery;

bearing overheating;

temperature of lubricating oil for bearings and reduction gears, as well as oil temperature in hydraulic drive systems exceeds allowable values specified in the manufacturers' instructions;

defects of instruments.

Causes of the above mentioned defects shall be identified and the defects shall be eliminated.

If abnormal vibration of auxiliary machinery is detected, its parameters shall be measured for assessment against technical standards and for development and implementation of vibration reduction actions.

7.5.3.21 Manufacturers' technical documentation and auxiliary machinery maintenance manuals shall be used for wear assessment of auxiliary machinery units and components, for assessment of allowable clearances in units.

7.5.4 Recommendations on surveys of auxiliary machinery.

7.5.4.1 Additional instructions and recommendations on thorough examination of some units and components of auxiliary machinery are given below:

.1 when surveying auxiliary machinery of any purpose, the condition of antifriction lining of sleeve bearings, the condition of roller bearings and their seats on shafts shall be checked.

Roller bearings shall be replaced when their service life, stated in the manufacturer's technical documentation and maintenance manuals, has expired, and where the defects preventing their further service have been detected;

.2 when surveying centrifugal and gear pumps, the condition of keys and keyways (key beds) on shafts, impellers and pinions shall be checked.

Centrifugal, screw and gear pumps shall be checked for the absence of damages to impellers, screws and pinions due to contacts with pump casings and screw housings or for the absence of traces due to touching pump casings and screw housings during the pump operation;

.3 when surveying ejectors, the information on the proper installation of the nozzle in relation to the diffuser shall be submitted to the surveyor. In this case, the surveyor shall assure himself that the distance between the nozzle outlet section and diffuser throat shall comply with the value specified in the manufacturer's technical documentation and maintenance manuals for ejectors;

.4 when surveying the motors and pumps of the hydraulic drives of auxiliary machinery, the results of the shaft alignment for hydraulic pumps and electric motors shall be submitted to the surveyor. In this case, the surveyor shall assure himself that the values of floats and axis breaks of the shafts and coupling boxes do not exceed values specified in the manufacturers' technical documentation and maintenance manuals for auxiliary machinery and hydraulic drive systems;

.5 during survey, the surveyor shall follow the Register-approved procedures for examinations, measurements and checks of equipment and arrangements to the extent of the requirements of the Rules for INS Surveys and with due regard for the manufacturers' requirements.

7.6 SYSTEMS AND PIPING

7.6.1 General.

7.6.1.1 Systems and piping (metal/plastic), valves used, as well as pipelines laying shall meet the technical requirements of Part VII "Systems and Piping" of the Rules for INS Construction.

7.6.1.2 When carrying out surveys of systems and piping, applicable provisions of Part II "Survey Schedule and Scope" of the Rules for the Classification Surveys of Ships in Service, as well as Instructions on Survey of Ship's Piping set out in Annex 26 to the Guidelines on Technical Supervision of Ships in Service shall be considered.

7.7 REFRIGERATING PLANTS

7.7.1 General.

7.7.1.1 Stationary refrigerating plants of inland navigation ships with compressor-type refrigerating machines working with refrigerants of Groups I and II shall meet the requirements of Part XII "Refrigerating Plants" of the Rules for the Classification and Construction of Sea-Going Ships.

7.7.1.2 Conditions for carrying out surveys of refrigerating plants are set forth in Part IV "Surveys of Refrigerating Plants" of the Rules for the Classification Surveys of Ships in Service.

8 SURVEY OF ELECTRICAL EQUIPMENT

8.1 GENERAL

8.1.1 During survey of the ship's electrical equipment, the applicable requirements of Part I "General Provisions" shall be met.

8.1.2 This Section sets the requirements for survey of the ship's electrical equipment which design is regulated by the Rules for INS Construction.

8.1.3 The installation of new electrical equipment on board the ship or replacement of the existing one with another type of electrical equipment shall be effected provided that the type of electrical equipment and technical documentation for its installation are approved by the Register.

The documents for new electrical equipment installed onboard additionally or instead of the existing equipment and prescribed by the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships shall be submitted to the surveyor. These documents shall confirm the compliance of the electrical equipment with the requirements of the Rules for INS Construction.

8.1.4 The new equipment shall be surveyed in the scope of initial survey.

8.1.5 Electrical equipment installed on board the ship at the discretion of the shipowner in addition to the electrical equipment required by the Rules for INS Construction shall be subject to the Register surveys in full scope only in case where it exactly duplicates the equipment required by the Rules for INS Construction in respect to its use and commutation with other types of equipment. The failure of additional equipment cannot be considered as a ground for non-issuing the Register documents to the ship. In this case the surveyor shall ascertain that the functioning or technical condition of additional equipment will not affect the serviceability of electrical equipment required by the Rules for INS Construction or other equipment, and will not cause any failure of such equipment.

8.1.6 During all types of surveys, the electrical equipment shall be prepared for survey so that to provide access, opening-up, dismantling or disassembling of units and components, where necessary. During the survey, on the surveyor's request, all required documents (drawings, descriptions, diagrams, files, passports, etc.), as well as machinery and electrical log books shall be submitted.

8.1.7 The scope of periodical surveys of electrical equipment is given in Table 1.3. The extent of separate examinations, measurements and checks specified in Table 1.3 shall be determined by the surveyor to the Register having regard to the particular survey conditions, service life, results of the previous surveys and the repairs and replacements made.

8.2 INITIAL SURVEY

8.2.1 Prior to the initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), the technical documentation for electrical equipment in the scope required for verification of compliance with the requirements of the Rules for INS Construction, together with the ship documentation (documents of competent supervisory bodies, electrical equipment manufacturer's certificates, etc.) shall be submitted to the surveyor.

List of necessary technical documentation on ship's electrical equipment is given in Appendix 1.

8.2.2 During the initial survey of a ship the compliance of electrical equipment design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service, shall be verified; for this purpose the following shall be checked:

.1 compliance of the electrical equipment design, configuration and arrangement on board the ship with the requirements of the Rules for INS Construction to ensure its proper use for intended purpose considering the ship's type, dimensions and area of navigation;

.2 availability on board the ship of necessary certificates of the Register and Register-recognized competent bodies on the electrical equipment installed;

.3 technical condition of electrical equipment to evaluate the quality of its manufacture and to detect any defects during the operational testing, to determine its readiness for use and serviceability.

8.2.3 Survey of electrical equipment during initial survey of the ship in service shall be carried out in the scope of special survey.

8.3 INTERMEDIATE SURVEY

8.3.1 The summarized scope of electrical equipment surveys during intermediate surveys is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of the survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

8.3.2 During intermediate survey of a ship, any changes in the electrical equipment configuration, design, arrangement and installation, as well as in its technical condition shall be identified. During the intermediate survey, the electrical equipment shall be subjected to:

- thorough examination of electrical equipment and cables in dangerous spaces and zones;
- measurement of insulation resistance of cables and wires;
- external examination of accumulator batteries, measurement of level and density of electrolyte in batteries;
- external examination of extra protection of cables;
- external examination of cable penetrations through bulkheads and decks;
- external examination of protective earthing of electrical equipment;
- external examination of lighting of compartments and spaces essential for propulsion and safety of ship, evacuation of people, and emergency lighting of embarkation stations;
- checking the availability of valid calibration records and/or calibration decals for switchgear instrumentation and control panels confirming that adequate calibration has been performed by the relevant competent bodies.

8.3.3 The duration of electrical equipment operational testing shall be determined by the surveyor to the Register.

8.4 SPECIAL SURVEY

8.4.1 The summarized scope of electrical equipment surveys during special surveys is given in Table 1.3. After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

8.4.2 During special survey of the ship, the electrical equipment configuration, design, arrangement, installation and technical characteristics shall be checked for compliance with the requirements of the Rules for INS Construction. The technical condition of electrical equipment shall also be assessed.

8.4.3 During special survey, the electrical equipment shall be subjected to:
thorough examination with opening-up, where necessary;
external examination;
measurement of insulation resistance;
checking the availability of valid calibration records and/or calibration decals for instrumentation confirming that adequate calibration has been performed by the relevant competent bodies, if appropriate;
operational testing.

8.4.4 During the examination of electrical equipment, the following shall be checked:
protective earthing of non-current carrying metal parts of electrical equipment, and earthing of shields and metal armour of cables;
degree of electrical equipment protection from harmful effect of the environment and protection of personnel from electric shock hazards;
availability of devices, which exclude self-loosening of fastening and contact bolts and studs on electrical equipment.

8.4.5 During the thorough examination of generators, exciters, electric motors and rotary converters, the following shall be checked:
condition of bed plates, end shields, shafts and bearings;
axial displacement of armature or rotor in sliding bearings;
clearances in the bearings of electrical machines of the electric propulsion plant (the clearances shall not exceed the limiting values specified by the manufacturer);
insulation of the external bearings of propulsion motors and main generators;
condition of surfaces of commutators and slip rings;
position of the cross-piece in accordance with the mark available, condition of brushes and brush unit;
condition of blocks and elements of the generator voltage regulation and self-excitation system;
air gaps of the electrical machines (the gaps shall not exceed the limiting values specified by the manufacturer).

During the examination attention shall be given to possible cracks in the bed plates, shafts of rotors and armatures, end shields of machines, as well as to damage to a layer of protective varnish of stator windings, armature and pole coils, and to winding insulation.

8.4.6 During the examination of transformers, the condition of windings, insulators, contacting connections, instrumentation (thermometers, level indicators) and ventilation shall be checked.

8.4.7 During the examination of accumulator batteries and battery compartments, the condition of battery shelves and fixing of batteries, of ventilating ducts and openings, safe-type lighting fixtures, cables shall be checked.

The density and level of electrolyte in batteries, the provision of a warning notice indicating the danger of explosion on the door leading to the battery compartment shall be checked.

The confirmation that accumulator battery capacity has been checked shall be submitted, or direct purpose discharge (discharge of the battery to the rated load) during the regulated time in order to check the battery capacity shall be performed.

8.4.8 During the examination of switchgear, control and monitoring panels of electric propulsion plant, main and emergency switchboards, power, lighting and group switchboards, start and control gear, and charging facilities, the following shall be checked:

condition of switching and protective devices, power semiconductor units;
compliance of current and voltage settings in circuit breakers, relays and fuses with the requirements of the Rules for INS Construction;

condition of busbar insulators and busbar supports;

availability of calibration records or calibration decals for electrical measuring instruments, of colour graduation lines on the scales of the devices taking the readings of the rated current, voltage, power, etc.

During the examination attention shall be given to revealing the burnt out and worn contacts, corrosion of current-carrying parts, loosening of the contact connections, damaged coil windings and internal wiring, spark arresters, equipment enclosures, etc.

8.4.9 During the examination of cabling, the condition of cables, panels, clips, pipes, packing boxes and glands in way of cable penetrations through watertight and fire-resisting bulkheads and decks, sight port holes and drainage holes of cable pipelines, as well as of the earthing of cable metal sheathing shall be checked.

On oil tankers the condition of cable on the catwalk bridge, compensation devices, earthing of cargo pipeline, rigging of mast and vent pipes shall be checked. The electrical equipment and cables in dangerous spaces and zones shall be thoroughly examined.

During the examination attention shall be given to the revealing cable sheathing damages, loose cables due to the corrosion of fastenings and connections of cables without junction boxes.

8.4.10 During the examination of lighting and navigation lights, the condition of fittings and wiring accessories of the main and emergency lighting fixtures, switches, plugs, etc. shall be checked.

8.4.11 During the examination of electrical cooking and heating appliances, the following shall be checked:

availability of fire-resistant insulation or sufficient air gaps between the heating appliances and combustible structures;

availability of protective enclosures excluding placing of foreign objects on them.

8.4.12 During the examination of internal communication and signalling devices the condition of the following items shall be checked:

rudder angle and pitch propeller indicators;

engine room telegraph, commutators and apparatuses of service telephone communication;

sound devices and luminous indicators of general alarm system, fire detectors, fire detection and fire alarm system control panel, audible and visual alarm, fans of smoke detection system, warning system indicating the release of fire extinguishing medium, etc.

8.4.13 During the examination of instrumentation, its condition and availability of valid records and/or calibration decal confirming that adequate calibration has been performed by the relevant competent bodies shall be checked.

8.4.14 Electrical equipment intended for domestic and process use shall also be examined with regard to connected cables, electrical protection, insulation and protective earthing.

8.5 ASSESSMENT OF TECHNICAL CONDITION OF ELECTRICAL EQUIPMENT

8.5.1 Technical condition of electrical equipment shall be assessed proceeding from the survey results using the reports on previous surveys and the information on wear, damages and defects revealed in operation, on repairs and replacements made and recorded in the ship documentation (condition assessment records, ship's reports, engine room log books, etc.).

8.5.2 Permissible wear and defect rates for electrical equipment items shall be determined on the basis of information contained in the manufacturer's manuals and data cards.

8.5.3 Where damages, defects or wears exceeding the permissible values or dangerous for the ship's operation are found during the survey of electrical equipment, the equipment shall not be considered fit for service until the defects are eliminated, and the ship shall not be found as fit for navigation. The opportunity of permit for operation of this equipment until the next repair or for a specified period with the operational restrictions shall be considered by the Register in each particular case.

9 SURVEY OF AUTOMATION EQUIPMENT AND AUTOMATION DEVICES

9.1 GENERAL

9.1.1 During survey of the ship's automation equipment, the applicable requirements of Part I "General Provisions" shall be met.

9.1.2 This Section sets the requirements for survey of the ship's automation equipment which design is regulated by the Rules for INS Construction.

9.1.3 The installation of new automation equipment on board the ship or replacement of the existing one with another type of automation equipment shall be effected provided that the type of automation equipment and technical documentation for its installation are approved by the Register.

The documents for new automation equipment installed onboard additionally or instead of the existing one and prescribed by the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships shall be submitted to the surveyor. These documents shall confirm the compliance of the automation equipment with the requirements of the Rules for INS Construction.

9.1.4 The new automation equipment shall be surveyed in the scope of initial survey.

9.1.5 Automation equipment installed on board the ship at the discretion of the shipowner in addition to the equipment required by the Rules for INS Construction shall be subject to the Register survey in full scope only in case where it exactly duplicates the equipment required by the Rules for INS Construction in respect to its use and commutation with other types of equipment. The failure of additional equipment cannot be considered as a ground for non-issuing the Register documents to the ship. In this case the surveyor shall ascertain that the functioning or technical condition of additional equipment will not affect the serviceability of automation equipment required by the Rules for INS Construction or other equipment, and will not cause any failure of such equipment.

9.1.6 During all types of surveys, the automation equipment shall be prepared for survey so that to provide access, opening-up, dismantling or disassembling of units and components, where necessary.

During the survey, on the surveyor's request, all required documents (drawings, descriptions, diagrams, files, passports, etc.), as well as machinery and electrical log books shall be submitted.

9.1.7 The scope of periodical surveys of automation equipment is given in Table 1.3.

The extent of separate examinations, measurements and checks specified in Table 1.3 shall be determined by the surveyor to the Register having regard to the particular survey conditions, service life, results of the previous surveys and the repairs and replacements made.

9.1.8 The intermediate and special surveys of automation equipment shall be carried out simultaneously with survey of automated machinery, arrangements and systems.

9.1.9 Surveys may be carried out within the scope of the special programme intended for the particular ships' design and approved by the Register.

9.1.10 Prior to survey the cargo systems of oil tankers shall be degassed.

9.2 INITIAL SURVEY

9.2.1 Prior to the initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), the technical documentation for automation equipment in the scope required for verification of compliance with the requirements of the Rules for INS Construction together with the ship documentation (documents of competent supervisory bodies, automation equipment manufacturer's certificates, etc.) shall be submitted to the surveyor.

List of necessary technical documentation on ship's automation equipment is listed in Appendix 1.

9.2.2 During initial survey of a ship, the compliance of automation equipment design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service, shall be verified; for this purpose the following shall be checked:

.1 compliance of the automation equipment design, configuration and arrangement on board the ship with the requirements of the Rules for INS Construction to ensure its proper use for intended purpose considering the ship's type, dimensions, area of navigation and automation mark (if any);

.2 availability on board the ship of necessary Register certificates on the automation equipment installed;

.3 technical condition of automation equipment to evaluate the quality of its manufacture and to detect any defects during the operational testing, to determine its readiness for use and serviceability.

9.2.3 Survey of automation equipment during initial survey of the ship in service shall be carried out in the scope of special survey.

At the Register discretion, the initial survey of the automation equipment may be reduced to the scope of annual survey, provided the ship has a valid automation mark in its class notation assigned by a recognized ACS.

9.2.4 During initial survey, the operational testing of automation equipment may be carried out without running trials. However, where necessary, these trials may be required proceeding from the technical condition of those arrangements and systems which are subjected to operational testing.

9.2.5 During initial surveys, the computers and computer-based automation systems used for monitoring and control of machinery and devices shall be operationally tested using test programmes and special programmes according to their intended purpose.

9.3 INTERMEDIATE SURVEY

9.3.1 The summarized scope of automation equipment surveys during intermediate surveys is given in Table 1.3.

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

9.3.2 During intermediate survey of a ship, any changes in the automation equipment configuration, design, arrangement and installation, as well as in its technical condition shall be identified. During the intermediate survey, the automation equipment shall be subjected to the following:

.1 control, governing, monitoring, alarm, indication and protection systems shall be examined and operationally tested during the relevant operation tests of machinery and devices;

.2 emergency stop devices of main machinery shall be operationally tested;

.3 remote starting of main machinery shall be tested when electric power supply is restored after blackout;

.4 changeover devices in control stations of main and auxiliary machinery (wheelhouse — main machinery control room — local control station), as well as the control devices of this machinery from each station shall be operationally tested;

.5 automation equipment of electric power plant shall be tested for automatic starting after blackout;

.6 auxiliary machinery essential for the operation of main machinery shall be tested by remote starting and shutdown (from the main machinery control room), and standby machinery shall be tested by automatic starting with a simultaneous alarm system inspection;

.7 protection systems of boiler plants shall be operationally tested under conditions of flame failure, water level drop in the boiler, air pressure drop before the boiler furnace, and the remote shutdown of the electric motor driving the fuel pump of the boiler.

9.3.3 The automated operation of machinery installation is prohibited if the remote automated control, governing, alarm or protection systems of main and auxiliary machinery essential for the operation of main machinery become inoperable, until the faulty automation equipment operability is restored.

9.3.4 During intermediate surveys, the computers and computer-based automation systems used for monitoring and control of machinery and devices subject to technical supervision shall be operationally tested using test programmes and special programmes according to their intended purpose.

9.3.5 The insulation resistance of electrical equipment and cabling forming part of the automation equipment shall be measured in compliance with the requirements of Section 8.

9.4 SPECIAL SURVEY

9.4.1 The summarized scope of automation equipment surveys during special surveys is given in Table 1.3.

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

9.4.2 During special survey of the ship, the automation equipment configuration, design, arrangement, installation and technical characteristics shall be checked for compliance with the requirements of the Rules for INS Construction. The technical condition of automation equipment shall also be assessed.

9.4.3 During special survey of automation equipment, irrespective of whether the ship has an automation mark in the class notation or not, as well as the remote automated control systems of main machinery, CPP, automated boiler plants, ship service systems, refrigerating plants, all the ships shall be subjected to:

- thorough examination with access, openings-up and dismantling provided, where necessary, at the surveyor's discretion;

- measurements required;

- operational testing during running and mooring trials.

9.4.4 During thorough examination, the surveyor shall ascertain that the defects listed below are absent:

- air and oil leaks through the seals of pneumatic and hydraulic equipment forming part of the automation systems;

- scores on the surface of the rods of servomotors, actuating mechanisms and other components with interacting surfaces;

- damage to insulation and cable screen, and other failures of electrical and electronic automation equipment;

- substantial corrosion on the surfaces of, and inside, elements and devices;

- faulty or inoperative instruments for local monitoring and measurement (thermometers, pressure gages, etc.) in their standard places;

- incorrect fastening of instruments, units, devices, etc.

9.4.5 During special survey, the settings for actuating sensors, alarms, relays, devices in protection, automation, alarm systems by reaching the specified values of monitored parameters (pressure, temperature, level, etc.) simulating actual conditions. In so doing, only such instrumentation shall be used that has calibration records and calibration decals confirming that it was calibrated on time by a competent body, and the accuracy of instrumentation shall be much higher than the accuracy of the equipment being monitored.

9.4.6 Availability of calibration records and calibration decals for standard instrumentation confirming that adequate calibration has been performed by the relevant competent bodies, if appropriate, shall be checked.

9.4.7 Monitored parameters, measuring points, limiting values of parameters, types of automatic protection and parameter indication in the main machinery control room of automated main propulsion plants, boiler plants, ship electric power plants, compressor, bilge and refrigerating plants are given in Table 9.4.7.

Table 9.4.7

Nos.	Monitored parameter	Measuring point	Limiting values of parameters	Automatic protection	Indication at main machinery control room ¹	Automatic protection
1	Main internal combustion engines					
1.1	Lubricating oil pressure	At engine inlet	Min	Engine shutdown	Continuous	—
1.2	Lubricating oil temperature	At engine inlet	Max	—	Continuous	—
1.3	Lubricating oil pressure differential	Across filter	Max	—	—	—
1.4	Turbocharger lubricating oil pressure	At bearing inlet	Min	— ²	—	—
1.5	Coolant pressure or flow in independent lubrication pump	At engine inlet	Min	Loading reduction	Continuous	When an independent lubricating pump is available
1.6	Coolant temperature	At engine outlet	Max	Loading reduction	On call	—
1.7	Cooling seawater pressure or flow	In cooling seawater system	Min	—	Continuous	—
1.8	Exhaust gas temperature	In main line	Max	—	—	—
1.9	Starting air pressure	Before starting valve	Min	—	Continuous	For reversible engines
1.10	Air pressure	In engine control system	Min	—	—	—
1.11	Scavenging air temperature	At scavenging air cooler outlet	Max	—	—	—
1.12	Fuel oil pressure	At high-pressure pump inlets	Min	—	On call	When independent fuel oil transfer pumps are installed
1.13	Fuel oil viscosity (temperature)	At engine inlet	Max (min)	—	—	When operating on heavy fuel oil
1.14	Fuel oil level	In daily-supply tank	Min	—	—	—
1.15	Fuel oil leakage	From high-pressure piping	Fuel oil presence	—	—	—
1.16	Engine speed	—	Max	Engine shutdown	Continuous	—
1.17	Power supply of remote control, alarm and protection systems	At system inlet	No power supply	—	—	—
1.18	Hydraulic oil pressure in CPP system	At filter outlet	Min	—	Continuous	—
1.19	CPP hydraulic oil level	In gravity tank	Min	—	—	—
2	Reduction gears					
2.1	Lubricating oil pressure	At reduction gear inlet	Min	Engine shutdown	—	—
2.2	Lubricating oil temperature	In reduction gear	Max	—	—	—
3	Internal combustion engines for driving generators					
3.1	Lubricating oil pressure	At engine inlet	Min	Engine shutdown	—	—
3.2	Coolant pressure or flow	At engine inlet	Min	—	—	—
3.3	Coolant temperature	At engine outlet	Max	—	—	—
3.4	Fuel oil leakage	From high-pressure piping	Fuel oil presence	—	—	—
3.5	Engine speed	Overspeed governor	Max	Engine shutdown	—	—
3.6	Starting air pressure	At starting valve inlet	Min	—	—	—
4	Ship's mains					
4.1	Voltage	MSB	Min, max	—	Continuous	—
4.2	Insulation resistance	MSB	Min	—	Continuous	—
5	Starting compressors					
5.1	Lubricating oil level	At compressor inlet	Min	Compressor shutdown	—	—
5.2	Air temperature	At compressor outlet	Max	—	—	—
6	Tanks					
6.1	Lubricating oil level	In daily-supply tanks	Min	—	—	For engines with dry crankcase
6.2	Fuel oil level	In daily-supply tanks	Min	—	—	For daily-supply tank of starting air compressors diesel drives, the alarm signal is brought out to the wheelhouse
6.3	Coolant level	In expansion tank	Min	—	—	—
7	Bilge plants					
7.1	Water level	In bilge wells	Max, min	—	—	When remotely controlled

Table 9.4.7 — continued

Nos.	Monitored parameter	Measuring point	Limiting values of parameters	Automatic protection	Indication at main machinery control room ¹	Automatic protection
7.2	Emergency water level	In bilge wells	Max	—	—	Alarm signal is brought out to the wheelhouse
8	Miscellaneous					
8.1	Boiler plant protection system	Supply unit	Failure	Boiler shutdown	—	Necessary only with oil burning installations
8.2	Alarm system	Supply unit	Failure	—	—	—
¹ Or in the location from where machinery control is provided (wheelhouse).						
² Where ships have only one main engine, that engine shall not be shut down automatically.						

9.4.8 During special survey, the automation equipment and systems shall be subjected to the examinations and testing as follows below.

9.4.9 Centralized monitoring systems.

Centralized monitoring systems shall be examined and operationally tested with the check of the following:

- efficiency of regulated monitoring and self-monitoring devices;
- serviceability of the illuminated indicator boards and sound signalling;
- possibility of operation at changing of power supply parameters;
- correctness of actuating for each monitored parameter with the simultaneous check of the general alarm system;
- actuating of alarm system at loss of power supply;
- actuating of alarm system at the failures in the centralized monitoring system;
- correctness of functioning of the mimic diagrams;
- call of monitored parameters (digital and analog monitoring) on the display.

9.4.10 Machinery installation automation systems.

9.4.10.1 Remote control and remote automated control systems of main machinery shall be examined and operationally tested with the check of the following:

- start and stop of the main machinery from the wheelhouse;
- reversing;
- control at the alarm system switched off with maintenance of monitoring according to constantly operating instruments;
- serviceability of the automatic protection;
- serviceability of remote automated control systems at de-energizing of the ship and the subsequent regeneration of voltage in the ship's network;
- automatic performance of intermediate operations;
- possibility of occurrence of inadmissible operation modes (spontaneous increase of number of revolutions, self-start, spontaneous reverse of main machinery), if the remote automated control system fails.

The following shall also be checked:

- urgent stop device;
- efficiency of interlocking;
- control change-over between the stations with checking the relevant alarm.

9.4.10.2 Systems of CPP remote automated control shall be examined and operationally tested with the check of:

- CPP-related functions listed in 9.4.10.1;
- time and speed of pitch adjustment;
- devices limiting the speed of CPP blade adjustment in increasing the propeller pitch in order to exclude engine overload.

9.4.10.3 Boiler plants shall be examined and operationally tested with the check of:

- protection of the boiler at flame failure;
- protection on extremely low water level in the boiler drum;
- protection on air pressure drop at furnace inlet;
- remote switching-off of the furnace inlet.

9.4.10.4 Prime movers for generator drive shall be examined and operationally tested with the check of:

- remote start and stop;
- automatic start of the standby engine at overload of the running one;
- automatic distribution of load with units running in parallel (if provided);
- operational integrity of automatic protection;
- maintenance of spinning reserve (if provided).

9.4.10.5 Automation equipment of compressors shall be examined and operationally tested with the check of:

- protection on oil pressure;
- protection on air temperature at outlet of compressor;
- air pressure when the compressor is automatically started and stopped.

9.4.10.6 Automation equipment of fuel oil and oil separators shall be examined and operationally tested with the check of protection and alarm provided proceeding from the separator type. The alarm in the bilge tanks of separator units shall also be checked.

9.4.11 General ship automation systems.

General ship automation systems shall be examined and operationally tested with the check of:

- remote and automatic start of bilge pumps with alarm of running of pumps and position of valves;
- remote opening and closing of valves;
- automatic control of valves;
- correctness of alarm in the mimic diagrams;
- alarm of open or closed condition of the fittings.

9.4.12 Regulation, monitoring, protection and alarm systems.

Regulation, monitoring, protection and alarm systems shall be examined and operationally tested together with the automation systems indicated in this Section.

9.4.13 Automation devices.

Automation devices (regulators, sensors, signalling devices) shall be examined (where accessible) and operationally tested together with the machinery, arrangements and systems indicated in this Section.

9.4.14 During special surveys, the computers and computer-based automation systems used for monitoring and control of machinery and devices subject to technical supervision shall be operationally tested using test programmes and special programmes according to their intended purpose.

9.4.15 The insulation resistance of electrical equipment and cabling forming part of the automation equipment shall be measured in compliance with the requirements of Section 8.

9.5 CLASSIFICATION OF AUTOMATION EQUIPMENT

9.5.1 Based on the results of the initial survey of automation equipment, its compliance with the requirements of the Rules for INS Construction shall be determined, and an automation mark in the class notation shall be assigned to the ship.

9.5.2 Based on the results of the intermediate survey of automation equipment, the automation mark in the class notation shall be confirmed.

9.5.3 Based on the results of the special survey of automation equipment, the automation mark in the class notation shall be renewed.

9.5.4 The automation mark in the class notation of the ship may be excluded or changed only after the relevant request of the shipowner and implementation of specific measures on ensuring the normal operation of continuously attended propulsion plant.

9.5.5 The automation equipment of ships without the automation mark in the class notation shall be classed simultaneously with the classification of machinery.

9.6 ASSESSMENT OF TECHNICAL CONDITION OF AUTOMATION EQUIPMENT

9.6.1 Where defects are found in the automation systems of main and auxiliary machinery on a ship having no automation mark in the class notation, the operation of such systems is prohibited until they are operable. In some cases, proceeding from the nature of the defects revealed, further operation of mechanical installation may be permitted by the Register with imposing restrictions on the area of navigation, operational period, etc., provided the shipowner request is submitted and specific measures on ensuring safe operation are implemented until elimination of the defects and putting into service the automation systems.

10 REQUIREMENTS FOR MEASURING EQUIPMENT USED IN SURVEYS OF SHIPS

10.1 Instruments and gauges (measuring equipment), which surveyors rely on to make decisions affecting classification or statutory certification, shall be individually identified and calibrated to a recognized national or international standard. The surveyor may accept simple measuring instruments (e.g., rulers, measuring tapes, weld gauges, micrometers) without individual identification or confirmation of calibration, provided they are standard commercial design, properly maintained and periodically compared with other similar equipment or test pieces. The surveyor shall satisfy himself that other equipment (e.g. tensile testing machines, ultrasonic thickness measuring equipment, etc.) is calibrated to a recognized national or international standard.

The measuring and test devices, equipment and instrument subject to verification (calibration), which are used onboard to monitor the parameters of supervised items and to carry out measurements shall be stamped (with calibration decals) and/or have documents (calibration records) confirming performance of their verification (calibration) by competent bodies.

10.2 When submitting shipboard measuring equipment for verification (calibration) at the port of call, the shipowners/operators shall specify in their requests that a laboratory (organization) performing calibration of measuring equipment was certified (recognized) by the State Committee for Standardization and Metrology. The document of the laboratory performing calibration of measuring equipment issued to the ship shall specify that the laboratory is certified (recognized) by the State Committee for Standardization and Metrology of the country, on which territory the laboratory resides.

10.3 The list of shipboard measuring equipment subject to calibration shall not be agreed with the RS Branch Office.

The Register does not set intervals between calibration of shipboard measuring equipment and measuring devices. The calibration intervals are set by the Flag State national standards or Flag State Maritime Administrations. The shipboard measuring equipment shall be calibrated within the specified intervals by competent bodies duly certified by the state authorities for performing calibration. At periodical surveys the surveyor checks whether measuring equipment was calibrated on time based on calibration records and/or calibration decals. If for the time of survey the terms of verification (calibration) of measuring equipment of essential items affecting operational safety and environmental protection are overdue, the surveyor shall demand performance of verification (calibration) prior to the survey.

10.4 When such verification (calibration) cannot be performed, the surveyor may accept measuring equipment fitted on board the ship and used in survey of shipboard equipment and machinery (e.g., pressure, temperature or rpm gages and meters) based either on calibration records or comparison of readings with multiple similar instruments. A ship report on comparative verification of measuring equipment using shipboard reference instrument or backup instrument or by any other equivalent method may serve as such calibration records. In such a case an occasional survey of measuring equipment shall be assigned after its verification (calibration), which shall be carried out within three months after expiry of specified term of verification or upon the ship arrival in the port, where the verification may be carried out, but not later than in six months.

PART III. SURVEY OF NAVIGATION SAFETY AND ENVIRONMENTAL PROTECTION MEANS

1 GENERAL

1.1 This Section contains requirements for survey of ship life-saving appliances, radio equipment, navigational equipment, signal means, equipment for prevention of pollution from ships, and also for survey of the ships carrying dangerous goods in compliance with ADN provisions.

2 SURVEY OF LIFE-SAVING APPLIANCES

2.1 GENERAL

2.1.1 During survey of the ship life-saving appliances, the applicable requirements of Part I "General Provisions" shall be met.

2.1.2 The installation of new life-saving appliances on board the ship or replacement of the existing ones with another type of life-saving appliances shall be effected provided that the type of these appliances and technical documentation for their installation are approved by the Register.

The documents for new life-saving appliances installed onboard additionally Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships shall be submitted to the surveyor. These documents shall confirm the compliance of life-saving appliances with the requirements of the Rules for INS Construction.

2.1.3 The new life-saving appliances shall be surveyed in the scope of initial survey.

2.1.4 Machinery, systems and electrical equipment forming part of the ship life-saving appliances shall be surveyed in compliance with the requirements set forth in the relevant sections of Part II "Survey Schedule, Scope and Procedure".

2.2 INITIAL SURVEY

2.2.1 During initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), the compliance of life-saving appliances design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service, shall be verified; for this purpose the following shall be checked:

.1 compliance of the life-saving appliances design and arrangement onboard with the requirements of the Rules for INS Construction to ensure their proper use for intended purpose and the safety of people on board the ship;

.2 compliance of the standards for equipment of ships with life-saving appliances with the requirements of the Rules for INS Construction. The shipowner shall submit the Equipment Certificates for life-saving appliances and arrangements;

.3 technical condition of life-saving appliances to evaluate the quality of their manufacture and to detect any defects (wear, damage, failures) during the operational testing, to determine their readiness for use and serviceability.

2.2.2 Survey of life-saving appliances during initial survey of the ship in service shall be carried out in the scope of special survey.

2.3 INTERMEDIATE SURVEY

2.3.1 The summarized scope of life-saving appliances surveys during intermediate surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

2.3.2 Survey of life-saving appliances and arrangements on passenger ships during the intermediate survey shall be carried out in the scope of special survey, except testing the launching appliances, lifeboats and rigid liferafts.

2.3.3 During intermediate survey of a ship, the launching appliances of lifeboats shall be subject to selective operational testing.

2.3.4 When assessing the technical condition as related to strength and tightness, the proof load testing of the launching appliances, lifeboats or checking of tightness of the boats and their air boxes or compartments of the rigid liferafts and buoyant apparatus may be required at the discretion of a surveyor.

2.3.5 During intermediate surveys, the documentation on periodical surveys and tests carried out at the survival craft station and proper marking of lifejackets and sealing of liferafts shall be verified.

2.3.6 During intermediate surveys of the ship, it is necessary to check whether the boats are fully equipped.

2.3.7 When assessing the technical condition of life-saving appliances, the wear and defect rates given in 2.4.7 shall be considered.

2.4 SPECIAL SURVEY

2.4.1 The summarized scope of life-saving appliances surveys during special surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

2.4.2 During special survey of a ship, the launching appliances, lifeboats, rigid liferafts and buoyant apparatuses shall be subjected to thorough examination. The launching appliances of each lifeboat and liferaft, and their mechanical drives shall be tested in operation.

2.4.3 During special surveys of ships 12 years of age and over, the launching appliances and the boats shall be tested by a proof load, and the tightness of the boats and their air boxes or compartments of the rigid liferafts and buoyant apparatus shall be checked.

2.4.3.1 All lifeboats shall have sufficient strength for safe launching with their full complement of persons and equipment. After loading the lifeboat up to 25 % in excess of its designed load (fully loaded and equipped condition) when the boat is suspended by its hooks it shall be launched without any residual deformations.

2.4.3.2 The strength of davits, falls, blocks and the other components of the launching appliance shall be sufficient for safe launching of the boat with full complement of persons and equipment.

2.4.4 During special surveys, the documentation on periodical surveys and tests carried out at the survival craft station and proper marking of lifejackets and sealing of liferafts shall be verified.

2.4.5 During special surveys, the preservation of size, filler quality shall be checked; lifebuoys and lifejackets shall be subjected to buoyancy and strength tests.

2.4.6 During special surveys of the ship, it is necessary to check whether the boats are fully equipped.

2.4.7 For assessment of life-saving appliances technical condition, the following shall be considered: lifeboats, rigid liferafts and damaged equipment with cracks, holes and dents, wooden boats when rotten and exceedingly leaky are not permitted for operation;

stressed details with average wear of 1/10 of as-built thickness or 1/10 of their diameter and more shall be replaced;

wire cable shall be replaced when 1/10 and more of total number of wires is broken in any length equal to eight times the rope diameter, as well as in case of excessive deformation of the cable;

natural fibre rope shall be replaced when at least one wire strand is broken, when rotten, excessively deteriorated or deformed;

lifebuoys and lifejackets shall be repaired or replaced when their proofing is damaged or rotten, the lifebuoy is deformed, its material is damaged, deteriorated with features of natural aging, its tape and grabline strength is impaired and its shape and characteristics of retroreflective marks are not as required.

If the survey reveals that the design and installation of life-saving appliances are not in compliance with the requirements of the Rules for INS Construction or are unserviceable, the ship is not recognized/approved as fit for navigation.

2.4.8 The Certificates issued by the Register for lifeboats and liferafts, rescue boats, buoyant apparatuses, launching appliances, hydrostatic release units, lifebuoys and lifejackets shall be available onboard.

3 SURVEY OF RADIO EQUIPMENT

3.1 GENERAL

3.1.1 During survey of the shipboard radio equipment, the applicable requirements of Part I "General Provisions" shall be met.

3.1.2 The installation of new radio equipment on board the ship or replacement of the existing one with another type of radio equipment shall be effected provided that the type of this equipment and technical documentation for its installation are approved by the Register.

The documents for new radio equipment installed onboard additionally or instead of the existing one, and prescribed by the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships shall be submitted to the surveyor. These documents shall confirm the compliance of radio equipment with the requirements of the Rules for INS Construction.

3.1.3 The new radio equipment shall be surveyed in the scope of initial survey.

3.1.4 Radio equipment installed on board the ship at the discretion of the shipowner in addition to the equipment required by the Rules for INS Construction shall be subject to the Register survey in full scope only in case where it exactly duplicates the equipment required by the Rules for INS Construction in respect to its use and commutation with other types of equipment, aerials (antennas) and sources of power (sources of energy). The failure of additional equipment cannot be considered as a ground for non-issuing the Register documents to the ship. In this case the surveyor shall ascertain that the functioning or technical condition of additional equipment will not affect the serviceability of radio equipment required by the Rules for INS Construction, or other equipment, and will not cause any failure of such equipment.

The additional equipment other than that required by the Rules for INS Construction shall be subject to the Registers survey in the scope which confirms that the functioning or technical condition of additional equipment will not affect the serviceability of radio equipment required by the Rules for INS Construction or other equipment, and will not cause any failure of such equipment.

3.1.5 The electrical equipment, machinery and systems structurally associated with the radio equipment or incorporated in its systems shall be surveyed in compliance with the requirements of the relevant sections of this Part.

3.2 INITIAL SURVEY

3.2.1 Prior to the initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), the technical documentation for radio equipment in the scope required for verification of compliance with the requirements of the Rules for INS Construction together with the ship documentation (documents of competent supervisory bodies, radio equipment manufacturer's certificates, etc.) shall be submitted to the surveyor.

3.2.2 During initial survey of a ship, the compliance of radio equipment design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship having regard to the subsequent editions of these Rules covering the ships in service shall be verified; for this purpose the examinations and checks of radio equipment shall consist of:

.1 checking for compliance of the radio equipment design, configuration and arrangement on board the ship with the requirements for radio equipment proper use according to intended purpose considering the ship's type and area of navigation;

.2 checking the availability on board the ship of necessary Register certificates on the radio equipment installed;

.3 assessment of radio equipment technical condition to evaluate the quality of its manufacture and to detect any defects during the operational testing, to determine its readiness for use and serviceability;

.4 confirming the ability to initiate the transmission of ship-to-shore distress alerts;

.5 examining all antennas including:

.5.1 visual examination of all antennas for absence of mechanical damage;

.5.2 checking insulation, reliability of input contacts and safety of all antennas;

.6 examining the reserve source of energy, including:

.6.1 checking there is sufficient capacity to operate for 1 h;

.6.2 and, if the reserve source of energy is a battery:

.6.2.1 checking its sitting and installation, checking whether the elements and terminals are damaged or corroded;

.6.2.2 where appropriate, checking its condition by special gravity measurement or voltage measurement;

.6.2.3 with the battery off charge, and the maximum required radio installation load connected to the reserve source of energy, checking the battery voltage and discharge current;

.6.2.4 checking that the charger(s) is(are) capable of re-charging the reserve battery within 10 h;

.7 examining the VHF radio station, including:

.7.1 checking for operation on channels 15, 16 and 17;

.7.2 checking frequency tolerance, transmission-line quality, and transmitter power output;

.7.3 checking for correct operation of all controls, including priority of control units;

.7.4 checking that the equipment operated from the main, emergency and reserve (if provided) sources of energy;

.7.5 checking for correct operation by on-air contact with a coast station or another ship;

.8 examining the portable VHF radio station, including:

.8.1 checking for correct operation on channel 16 and one other by testing with another fixed or portable VHF apparatus;

.8.2 checking the battery charging arrangements where re-chargeable batteries are used;

.8.3 checking the expiry date of primary batteries, where used;

.8.4 where appropriate, checking any fixed installation, provided in a survival craft (lifeboat or liferaft);

.9 examining the portable UHF radio station for interior communication, including:

.9.1 checking for correct operation on calling and distress channel and one other channel by testing with another fixed or portable UHF radio station;

.9.2 checking the battery charging arrangements where re-chargeable batteries are used;

- .9.3 checking the expiry date of primary batteries, where used;
- .10 examining the radar transponder(s), including:
 - .10.1 checking the position and mounting;
 - .10.2 checking the battery expiry date of primary batteries;
- .11 examining and operational testing of the equipment for public address system, including:
 - checking for proper functioning of controls;
 - checking the reliability of remote switching on/activating, forcibly inserted broadcasting system, devices for commutation of broadcasting relay lines and other controls in each command microphone post;
 - checking for proper operation of main broadcasting lines;
- .12 examining the test equipment and spares carried to ensure carriage is adequate in accordance with the operational areas in which the ship trades and the declared options for maintaining availability of the functional requirements;
- .13 examining the spaces intended for installation of the radio equipment including:
 - checking adequacy of the heating system fitted in the spaces intended for installation of radio equipment;
 - checking availability of emergency lighting;
 - checking that transit electric cables and piping are not laid through the spaces intended for installation of radio equipment;
- .14 examining the location and fitting of the radio communication facilities, including:
 - checking compliance with the requirements of the Rules for INS Construction in relation to the inadmissible installation of the rotary converters, as well as outfit and equipment not pertaining to radio communications, but capable of affecting the normal operation of the radio equipment and creating negative conditions for effective use of radio equipment in the spaces intended for radio equipment;
 - checking compliance of the radio equipment location with the requirements of the Rules for INS Construction and approved technical documentation;
- .15 examining the location and fitting of the radio equipment in the generator room, including:
 - checking the correctness of installation of the rotary converters in respect to the ship's center line;
 - checking the protection for rotary details of the converters;
 - checking compliance of the radio equipment fastening with the requirements of the Rules for INS Construction and approved technical documentation;
- .16 examining the location and fitting of the radio equipment in the accumulator battery room, including:
 - checking compliance with the provision that no devices producing sparks and high temperature are installed in the accumulator battery room, and no transit cables are laid;
 - checking compliance of the accumulator battery boxes arrangement and location of the accumulators in them with the requirements of the Rules for INS Construction;
 - checking availability of the maintenance and operational safety instruction for the accumulator;
- .17 examining the location of the equipment for public address system, at that the compliance of the arrangement of the command microphone posts with the requirements of the Rules for INS Construction and approved technical documentation shall be verified;
- .18 checking the cable laying for correctness, and the cabling serviceability, including:
 - checking the quality of cabling;
 - checking whether cabling is made by means of screened cabling, as well as availability of earthing;
 - checking availability of devices for protection against radio interference and lightning discharges (if any);
 - checking the insulation resistance;
- .19 checking the operability of the ship's antennas and earthing, including:
 - checking for absence of mechanical damage;
 - checking the functioning of control gear and switchgear;
 - checking the reliability of input contacts;
 - checking availability of brief maintenance manual.

3.2.3 The radio equipment deficiency means the partial failure of its operability or operational mode, the failure of tuning.

The radio equipment having deficiencies which are dangerous for the safety of the ship's navigation shall be excluded from operation.

3.2.4 In cases where the radio equipment installed on board the ship in addition to the equipment required by the Rules for INS Construction is found not to be in compliance with these Rules, this shall not be considered as a ground to recognize the ship as not fit for navigation.

3.2.5 Technical condition of radio equipment shall be assessed proceeding from the survey results using the reports on previous surveys and the information on damages and defects revealed in operation, on repairs and replacements made and recorded in the ship documentation.

3.2.6 Survey of radio equipment during initial survey of the ship in service shall be carried out in the scope of special survey.

3.3 INTERMEDIATE SURVEY

3.3.1 The summarized scope of radio equipment surveys during intermediate surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated. The intermediate survey of passenger ships is carried out in the scope of special survey.

3.3.2 During intermediate survey of a ship, any changes in the radio equipment configuration, design, arrangement and installation, as well as in its technical condition shall be identified. The extent of separate examinations, measurements and operational testing specified in Table 1.3, Part II "Survey Schedule, Scope and Procedure" shall be determined by the surveyor to the Register proceeding from the relevant requirements of this Section having regard to the particular conditions of the survey.

3.3.3 The serviceability of the radio equipment installed on board the ship in compliance with the requirements of the Rules for INS Construction shall be ensured by the shore-based maintenance, and this fact shall be confirmed by the relevant agreement submitted to the surveyor.

The deficiencies in the radio equipment found during its maintenance shall be removed prior to intermediate survey.

3.4 SPECIAL SURVEY

3.4.1 The summarized scope of radio equipment surveys during special surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

3.4.2 During special survey of a ship, the thorough examination of radio equipment shall consist of:

.1 checking for compliance of the radio equipment design, configuration and arrangement on board the ship with the requirements of the Rules for INS Construction to ensure its proper use for intended purpose considering the ship's type and area of navigation;

.2 assessment of radio equipment technical condition to evaluate the quality of its manufacture and to detect any defects during the operational testing, to determine its readiness for use and serviceability;

.3 confirming the ability initiate the transmission of ship-to-shore distress alerts;

.4 examining all antennas including:

.4.1 visual examination of all antennas for absence of mechanical damage;

.4.2 checking insulation, reliability of input contacts and safety of all antennas;

.5 examining the reserve source of energy, including:

.5.1 checking there is sufficient capacity to operate for 1 h;

.5.2 and, if the reserve source of energy is a battery:

.5.2.1 checking its sitting and installation, checking whether the elements and terminals are damaged or corroded;

.5.2.2 where appropriate, checking its condition by special gravity measurement or voltage measurement;

.5.2.3 with the battery off charge, and the maximum required radio installation load connected to the reserve source of energy, checking the battery voltage and discharge current;

.5.2.4 checking that the charger(s) capable of re-charging the reserve battery within 10 h;

.6 examining the VHF radio station, including:

.6.1 checking for operation on channels 15, 16 and 17;

.6.2 checking frequency tolerance, transmission-line quality, and transmitter power output;

.6.3 checking for correct operation of all controls, including priority of control units;

.6.4 checking that the equipment operated from the main, emergency and reserve (if provided) sources of energy;

.6.5 checking for correct operation by on-air contact with a coast station or another ship;

.7 examining the portable VHF radio station, including:

.7.1 checking for correct operation on channel 16 and one other by testing with another fixed or portable VHF apparatus;

.7.2 checking the battery charging arrangements where re-chargeable batteries are used;

.7.3 checking the expiry date of primary batteries, where used;

.7.4 where appropriate, checking any fixed installation, provided in a survival craft (lifeboat or liferaft);

.8 examining the portable UHF radio station for interior communication including:

.8.1 checking for correct operation on calling and distress channel and one other channel by testing with another fixed or portable UHF radio station;

.8.2 checking the battery charging where re-chargeable batteries are used;

.8.3 checking the expiry date of primary batteries, where used;

.9 examining the radar transponder(s), including:

.9.1 checking the position and mounting;

.9.2 checking the battery expiry date of primary battery;

.10 examining and operational testing of the equipment for public address system, including:

.10.1 checking for proper functioning of controls;

.10.2 checking the reliability of remote switching on/activating, forcibly inserted broadcasting system, devices for commutation of broadcasting relay lines and other controls in each command microphone post;

.10.3 checking for proper operation of main broadcasting lines;

.11 examining the test equipment and spares carried to ensure carriage is adequate in accordance with the operational areas in which the ship trades and the declared options for maintaining availability of the functional requirements;

.12 examining the spaces intended for installation of the radio equipment, including:

.12.1 checking adequacy of the heating system fitted in the space intended for installation of radio equipment;

.12.2 checking the operability of emergency lighting;

.12.3 checking that transit electric cables and piping are not laid through the spaces intended for installation of radio equipment;

.13 examining the location and fitting of the radio communication facilities, the compliance with the requirements of the Rules for INS Construction in relation to the inadmissible installation of the rotary converters, as well as outfit and equipment not pertaining to radio communications, but capable of affecting the normal operation of the radio equipment and creating negative conditions for effective use of radio equipment in the spaces intended for radio equipment, shall be checked;

.14 examining the location and fitting of the radio equipment in the generator room, the protection for rotary details of converters shall be checked;

.15 examining the location and fitting of the radio equipment in the accumulator battery room, including:

.15.1 checking compliance with the provision that no devices producing sparks and high temperature are installed in the accumulator battery room, and no transit cables are laid;

.15.2 checking compliance of the accumulator battery boxes arrangement and location of the accumulators in them with the requirements of the Rules for INS Construction;

.15.3 checking availability of the maintenance and operational safety instruction for the accumulator;

.16 checking the cable laying for correctness, and the cabling serviceability, including:

.16.1 checking the quality of cabling;

.16.2 checking whether cabling is made by means of screened cabling, as well as availability of earthing;

.16.3 checking availability of devices for protection against radio interference and lightning discharges (if any);

.16.4 checking the insulation resistance;

.17 checking the operability of the ship's antennas and earthing, including:

.17.1 checking for absence of mechanical damage;

.17.2 checking the functioning of control gear and switchgear;

.17.3 checking the reliability of input contacts;

.17.4 checking availability of a brief maintenance manual.

3.4.3 The radio equipment deficiency means the partial failure of its operability or operational mode, the failure of tuning.

The radio equipment having deficiencies which are dangerous for the safety of the ship's navigation shall be excluded from operation.

3.4.4 In cases where the radio equipment installed on board the ship in addition to the equipment required by the Rules for INS Construction is found not to be in compliance with these Rules, this shall not be considered as a ground to recognize the ship as not fit for navigation.

3.4.5 Technical condition of radio equipment shall be assessed proceeding from the survey results using the reports on previous surveys and the information on damages and defects revealed in operation, on repairs and replacements made and recorded in the ship documentation.

4 SURVEY OF NAVIGATIONAL EQUIPMENT

4.1 GENERAL

4.1.1 The requirements of this Section apply to the ships whose navigational equipment is subject to the Register technical supervision.

Hydrofoils, air cushion vehicles, planing boats and other high-speed craft shall meet the requirements of this Section, as far as reasonable and practicable.

4.1.2 The navigational devices and appliances forming part of the navigational equipment shall be of the type approved by the Register. The navigational devices and appliances manufactured without the RS technical supervision and not having the Type Approval Certificate issued by the Register, may be admitted for installation on board the ship after considering the technical documentation on carrying out surveys and tests according to the Register-approved program.

The installation of new navigational equipment on board the ship or replacement of the existing one with another type of navigational equipment shall be effected provided that the type of this equipment and technical documentation for its installation are approved by the Register.

The documents for new navigational equipment installed onboard additionally or instead of the existing one, and prescribed by the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships shall be submitted to the surveyor. These documents shall confirm the compliance of navigational equipment with the requirements of the Rules for INS Construction.

The new navigational equipment shall be surveyed in the scope of initial survey.

4.1.3 The availability of up-to-date nautical charts and other nautical publications shall be checked during each survey.

In so doing, the electronic chart display and information system complying with the requirements of the Rules for INS Construction and having a Type Approval Certificate, may be used as a substitute for the up-to-date nautical charts only if the last edition of the chart information issued by an authorized hydrographic offices is available on board the ship.

4.1.4 The navigational equipment specified by the Rules for INS Construction, but being not mandatory for installation on board the ship, shall be subjected to the survey by the Register with due regard for the procedure and scope being established in each case, generally including operational testing (at each survey of the ship) and thorough examination (at special survey).

4.1.5 The electrical equipment, machinery and systems structurally associated with the navigational equipment or incorporated in its system shall be surveyed in compliance with the requirements of the relevant sections of Part II "Survey Schedule, Scope and Procedure".

4.2 INITIAL SURVEY

4.2.1 Prior to the initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), the technical documentation for navigational equipment in the scope required for verification of compliance with the requirements of the Rules for INS Construction together with ship documentation (documents of competent supervisory bodies, navigational equipment manufacturer's certificates, etc.) shall be submitted to the surveyor.

4.2.2 During initial survey of a ship, the compliance of navigational equipment design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service, shall be verified; for this purpose the following shall be checked:

.1 compliance of the navigational equipment design, configuration and arrangement on board the ship with the requirements of the Rules for INS Construction to ensure its proper use for intended purpose considering the ship's type, dimensions and area of navigation;

.2 availability on board the ship of necessary Register certificates on the navigational equipment installed;

.3 technical condition of navigational equipment to evaluate the quality of its manufacture and to detect any defects during the operational testing, to determine its readiness for use and serviceability.

4.2.3 The compliance with the structural requirements of the Rules for INS Construction in relation to the accuracy of readings, sensitivity, vibration stability, and other similar requirements, the testing of which is effected with the use of special tests and relevant devices, shall be verified by certificates and other documents confirming the compliance of the navigational equipment to with the requirements of these Rules.

4.2.4 Survey of navigational equipment during initial survey of the ship in service shall be carried out in the scope of special survey.

4.3 INTERMEDIATE SURVEY

4.3.1 The summarized scope of navigational equipment survey during intermediate surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated. The intermediate survey of passenger ships is carried out in the scope of special survey.

4.3.2 The operational testing of navigational equipment during intermediate survey is effected by means of the mandatory check of its activation, by the check of the availability of the readings and operation of controls and alarm systems.

4.4 SPECIAL SURVEY

4.4.1 The summarized scope of navigational equipment survey during special surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

4.4.2 During special survey of a ship, the navigational equipment shall be subjected to thorough examination.

4.4.3 During special survey, the navigational equipment shall be operationally tested when the ship is under way, together with the control checking of the technical and operational characteristics of the ship.

4.4.4 The operability of navigational equipment is established by:

the operation of the devices by the attending surveyor;

checking the documentation submitted by the shipowner (reports, protocols or other documents issued by the specialized organizations and confirming good technical condition of the devices).

The periodical check of the navigational equipment, its repairs, installation, replacement, adjustment, as well as the periodical verification (calibration) of instrumentation (measuring instruments) shall be carried out by the specialized organizations recognized by the Register with the issuance of the relevant documents. Exception may be made for the organizations performing examination and calibration of measuring instruments, and which are recognized by the State Committee for Standardization and Metrology.

4.4.5 Technical condition of navigational equipment shall be assessed proceeding from the survey results using the reports on previous surveys and the information on damages and defects revealed in operation, on repairs and replacements made and recorded in the ship documentation.

4.4.6 If during the survey of navigational equipment its mandatory configuration, design and arrangement is not found to be in compliance with the requirements of the Rules for INS Construction, or its failures of this equipment are detected, the ship is not recognized as fit for navigation.

5 SURVEY OF SIGNAL MEANS

5.1 GENERAL

5.1.1 The requirements of this Section apply to the ships whose signal means are subject to the Register technical supervision.

5.1.2 The devices and arrangements forming part of the signal means fitted onboard shall be of the type approved by the Register. The signal means manufactured without the RS technical supervision and not having the Type Approval Certificate issued by the Register, may be admitted for fitting on board the ship after considering the technical documentation on carrying out surveys and tests according to the RS-approved program.

The installation of new signal means on board the ship or replacement of the existing ones with another type of signal means shall be effected provided that the type of these signal means and technical documentation for their installation are approved by the Register. The documents for new signal means installed onboard additionally or instead of the existing ones, and prescribed by the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships shall be submitted to the surveyor. These documents shall confirm the compliance of signal means with the requirements of the Rules for INS Construction.

The new signal means shall be surveyed in the scope of initial survey.

5.1.3 The electrical equipment pertinent to the signal means shall be surveyed in compliance with the requirements set forth in the relevant sections of these Rules.

5.2 INITIAL SURVEY

5.2.1 During initial survey of a ship in service (refer to 3.2, Part I "General Provisions"), the compliance of signal means design with the requirements of the Rules for INS Construction in force on the date of construction of the particular ship, having regard to the subsequent editions of these Rules covering the ships in service, shall be verified; for this purpose the following shall be checked:

.1 compliance of the signal means design and arrangement onboard with the requirements of the Rules for INS Construction to ensure their proper use for intended purpose considering the ship's type, dimensions and area of navigation;

.2 compliance of the standards for equipment of ships with signal means with the requirements of the Rules for INS Construction. The shipowner shall submit the Equipment Certificates for navigation lights, flashing lights, and sound signal means;

.3 technical condition of signal means to evaluate the quality of their manufacture and to detect any defects during the operational testing, to determine their readiness for use and serviceability.

5.2.2 Survey of signal means during initial survey of the ship in service is carried out in the scope of special survey.

5.3 INTERMEDIATE SURVEY

5.3.1 The summarized scope of signal means survey during intermediate surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

Schedule of intermediate surveys is given in 4.2, Part I "General Provisions".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

5.3.2 Survey of signal means fitted on board the passenger ships during the intermediate survey shall be carried out in the scope of special survey.

5.3.3 During intermediate survey of a ship, the navigation lights, flashing lights, and sound signal means shall be operationally tested. In this case the visual and sound alarms of navigation lights and the automatic controls ensuring sounding on the whistle in fog shall also be operationally tested. During this survey, the signal shapes and pyrotechnic signal means, as well as signal masts and their rigging shall be subjected to external examination.

5.4 SPECIAL SURVEY

5.4.1 The summarized scope of signal means survey during special survey is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

After completion of survey cycle set forth for the particular ship submitted for survey (refer to 4.1.1 and 4.1.2, Part I "General Provisions"), the surveys shall be repeated.

5.4.2 During special survey of a ship, the navigation and flashing lights shall be subjected to thorough examination. During the survey, the following shall be checked: the correct installation of lights and sound signal means, and the availability of spare parts for the lights. The visual and sound alarms of navigation lights and automatic controls ensuring sounding on the whistle in fog shall also be operationally tested. The signal shapes and pyrotechnic signal means shall be subjected to external examination.

5.4.3 The signal masts and their rigging shall be thoroughly examined.

When assessing the technical condition of signal masts and their rigging, the following shall be considered:

- average wear of steel mast plates shall not exceed 1/5 of the as-built thickness;

- wooden masts shall be replaced if rotten by 1/10 and more of their cross-sectional area;

- application of stressed components having an average wear of 1/10 and more of their as-built thickness or diameter is not permitted;

- a steel rope shall be replaced if the number of broken wires is 1/10 and more of their total number at any point of its length equal to eight times the diameter, as well as where the rope is excessively worn or deformed.

5.4.4 If the survey reveals that the design and installation of signal means are not in compliance with the requirements the Rules for INS Construction or are unserviceable, the ship is not recognized as fit for navigation.

6 SURVEY OF EQUIPMENT FOR PREVENTION OF POLLUTION FROM SHIPS

6.1 GENERAL

6.1.1 This Section sets the requirements for survey of equipment, arrangements and systems installed on board the INS, which are covered by the requirements of 1.3, Part I "General Provisions" and intended for environmental protection.

Considering restrictions including complete prohibition of discharge of essentially all kinds of pollutants (wastes) within the areas of INS navigation, this Section specifies the requirements for survey of equipment and systems intended for collection, storage and discharge of these pollutants to shore reception facilities.

6.1.2 The installation on board the ship of new equipment and systems or replacement of unserviceable equipment with another type of equipment may be effected, provided that the type of this equipment and technical documentation for its installation are approved by the Register.

6.2 SURVEY OF EQUIPMENT FOR PREVENTION OF POLLUTION BY OIL

This Chapter does not contain any requirements for survey of crude oil washing system, filtering equipment (15 ppm separators), bilge (15 ppm) alarms, oil/water interface detectors in slop tanks, oil discharge monitoring and control systems in oil tankers.

In case where the above mentioned equipment and arrangements are used on board the ship, and if they are subject to surveys, the applicable provisions specified in 2.2.1, Part III "Survey of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for Equipment of Sea-Going Ships" of the Guidelines on Technical Supervision of Ships in Service shall be met.

6.2.1 Segregated ballast, cargo, slop, holding tanks.

6.2.1.1 General.

Paragraph 6.2.1 sets the requirements for bilge water holding tanks, oil residue (sludge) tanks, cargo tanks, segregated ballast tanks and slop tanks (if applicable), including associated equipment, pipelines and valves.

For the purpose of tanks internal examination they shall be prepared for survey, cleaned and degassed. The summarized scope of tank surveys during periodical surveys of ships is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

No intermediate surveys are carried out during survey of the equipment for prevention of pollution by oil.

6.2.1.2 Initial survey.

6.2.1.2.1 The scope of tanks survey at initial survey of a ship is determined proceeding from the scope of special survey of the ship, subject to the ship's age, having regard to the potential reduction of the survey scope, provided that the documents of the Register or other recognized competent supervisory bodies are available.

6.2.1.2.2 Prior to survey, the technical documentation relating to tanks specified in 6.2.1.1 shall be submitted to the surveyor. In particular, the following documentation shall be submitted:

- calculation of the required capacity of bilge water holding tanks and oil residue tanks;
- general arrangement plan of the above tanks;
- diagrams of pipelines connected to those tanks.

For oil tankers, the following shall be submitted additionally:

- calculation of the required capacity of slop tanks;
- diagram of the system for emergency transfer of oil;
- arrangement plan of discharge outlets;
- diagram of the system of collection, storage and discharge of oily mixtures from cargo area.

Based on the results of the technical documentation review, the compliance of the tanks with the requirements of the Rules for INS Construction and of the technical documentation submitted shall be determined, and the tanks shall be surveyed in the scope of special survey.

6.2.1.3 Special survey.

6.2.1.3.1 During special survey, the compliance of arrangement, construction, size and capacity of tanks with the approved technical documentation shall be checked, and the changes in technical condition of the tanks shall be identified.

Tanks shall be degassed and prepared for survey.

6.2.1.3.2 During special survey, the availability of the following documents shall be checked:

- calculations of the required capacity of bilge water holding tanks and of oil residue tanks;
- reports on previous surveys.

6.2.1.3.3 All ships shall be checked for the following:

- separation of fuel oil system from ballast systems through familiarization with the ship's diagrams/plans;

- availability of bilge water holding tanks, oil residue tanks, visual and audible alarm operating in case of 80 % filling of the tank, compliance of records made in the ship documents with the data given in the tank arrangement plan and tank capacity tables, availability of tank heating systems and steaming-out lines;

piping to and from oil residue (sludge) tanks shall have no direct connection overboard, other than common pipelines to the standard discharge connections;

the discharge pipelines of pumps of oil residue (sludge) tanks shall not be connected to the bilge water piping and tanks, except for the common pipeline to the standard discharge connection. On existing ships it is permitted to separate pipelines of the oil residue (sludge) tanks from the pipelines of the bilge water tanks by blind flanges.

6.2.1.3.4 Oil tankers, shall be additionally checked for the following:

absence of connections between the segregated ballast system and any other systems;

absence of indications of pollution by oil in the segregated ballast tanks;

absence of leakages from the pipelines of the ballast and cargo oil systems;

inlet and filling pipe connections;

installation of the level remote control and alarm sensors in cargo and slop (if applicable) tanks.

6.2.2 Pumping, piping and discharge arrangements for oily mixtures.

6.2.2.1 General.

6.2.2.1.1 Paragraph 6.2.2 sets the requirements for pumping and discharge arrangements for oily mixtures including pumps, pipelines, valves, instrumentation and other associated equipment (hereinafter referred to as "arrangement" and "arrangements").

The summarized scope of arrangement surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

6.2.2.1.2 The arrangements operational testing shall be carried out together with operational testing of the pumps serving them and other equipment.

6.2.2.1.3 During all types of surveys, the technical condition of associated electrical equipment (electric drives of pumps, alarms, cabling) shall be assessed, the results of electrical equipment and cabling insulation resistance measurements shall be checked.

6.2.2.2 Initial survey.

6.2.2.2.1 The scope of arrangements survey at initial survey of a ship shall be determined proceeding from the scope of special survey of the ship, subject to its age, having regard to the potential reduction of the survey scope, provided that the documents of the Register or other recognized competent supervisory bodies are available. The hydraulic test of the arrangement shall be carried out in compliance with 6.2.2.4.4.

6.2.2.2.2 Prior to survey, the technical documentation including, as a minimum, circuit diagrams of the relevant arrangements, as well as descriptions and operation manuals for these arrangements (if available on board the ship) shall be submitted to the surveyor.

6.2.2.2.3 During initial survey, all ships shall be checked for the following:

availability and condition of standard discharge connections provided with blank flanges and having nameplates on pipelines for discharge of oily bilge water to reception facilities and meeting the requirements of the Rules for INS Construction;

availability of a designated pump for the disposal of oil residue tank content to reception facilities, and location of the arrangement pipelines;

availability and condition of other arrangements for oil residue (sludge) discharge approved by the Register;

availability and condition of the system for collection of oily bilge water and discharge thereof to reception facilities.

6.2.2.2.4 Oil tankers shall be additionally checked for the following:

availability of the pipeline for the discharge of residues from machinery bilges to reception facilities, as well as to slop tanks (if applicable);

availability and condition of piping system for discharge oily mixtures from cargo and slop tanks (if applicable) to reception facilities, as well as positive communication system between the observation position and the discharge control position;

equipment for emergency discharge of the segregated ballast through the cargo pump (if applicable);

means to drain the cargo pumps and pipelines, including the stripping devices (if applicable).

6.2.2.2.5 The arrangements shall be operationally tested in compliance with 6.2.2.4.8.

6.2.2.3 Intermediate survey.

6.2.2.3.1 During intermediate survey, the changes in the technical condition of the arrangements shall be identified.

6.2.2.3.2 During intermediate survey, the checks shall be carried out in compliance with 6.2.2.2.3 and 6.2.2.2.4.

6.2.2.3.3 The arrangement pipelines and their valves shall be subjected to external examination in accessible places and to operational testing in compliance with 6.2.2.4.9.

6.2.2.4 Special survey.

6.2.2.4.1 During special survey, the arrangements shall be checked for compliance with the approved technical documentation.

6.2.2.4.2 Special survey shall be carried out in the scope of intermediate survey (refer to 6.2.2.3).

6.2.2.4.3 During special survey of oil tankers, it shall be also checked the condition of:
pipelines and valves of slop tanks or cargo tanks designated for use as the slop ones;
pipelines and valves of the arrangement for discharge of oily mixtures to reception facilities.

6.2.2.4.4 The pipelines and valves of the arrangements shall be tested by test pressure in compliance with the requirements specified in Section 8, Part V "Technical Supervision during Construction of Ships" of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships.

Each hydraulic test of the arrangements shall follow thorough examination of equipment, piping and valves. Prior to the hydraulic test, the defects revealed shall be eliminated.

Hydraulic tests shall be conducted during each special survey.

Note. During initial survey of a ship in service, the hydraulic tests may be postponed for the next special survey, in case of availability of the documents issued by the Register or recognized competent supervisory bodies upon satisfactory results of the previous surveys and hydraulic tests, and if the arrangements external examination and operational testing during initial survey confirm their good technical condition.

The arrangements shall be considered to have passed the hydraulic tests, if no leakages in joints and valves, cracks, ruptures, visible residual deformations and other defects are found.

6.2.2.4.5 The arrangements shall be operationally tested in compliance with 6.2.2.4.8 and 6.2.2.4.9.

6.2.2.4.6 The operational testing of the arrangements shall be carried to the extent subject to the type of survey.

6.2.2.4.7 The operational testing of the arrangements shall be carried out using oily waters, sea water or by simulation methods depending on the conditions of test performance.

6.2.2.4.8 During special and initial surveys, the arrangements shall be operationally tested, at that the following shall be checked:

for all ships, serviceability of pumps serving the arrangements, including oily water discharge pumps and relevant pipelines;

actuation of visual and audible alarm operating in case of 80 % filling of the bilge water holding tanks and oil residue tanks;

serviceability of the heating system of the bilge water holding tanks and oil residue tanks (if tank design provides for heating system);

operation of the means for remote stopping of discharge provided at the observation position in way of manifolds for the discharge of oily water and oil residues, or operation of the positive communication (such as telephone or radio system) between the observation position and discharge control position;

operation of the devices for manual starting and stopping of the discharge arrangements;

serviceability of a designated pump for the disposal of oil residue tank content to reception facilities, and of relevant pipelines for removal of oil residues (sludge);

compliance of the capacity of oil residue (sludge) tanks and bilge water holding tanks with the requirements of the Rules for INS Construction, where, at the surveyor's discretion, such check is reasonable and practicable; possibility of sealing the stop valves of the pipelines for discharge of oily bilge water.

Oil tankers shall be additionally checked for proper functioning (if it is reasonable and practicable under the conditions of survey performance) of:

pipelines and valves of slop tanks;
pipelines and valves of the arrangement for discharge of oily mixtures from cargo and slop tanks
(if applicable) to reception facilities.

6.2.2.4.9 During intermediate surveys, the arrangements shall be operationally tested in compliance with 6.2.2.4.8, but, at the surveyor's discretion, the survey scope may be reduced subject to the age of ship, service life of piping, valves and machinery, data on their operation in service, replacements, and results of the previous survey.

6.3 SURVEY OF EQUIPMENT FOR PREVENTION OF POLLUTION BY SEWAGE

This Chapter does not contain any requirements for survey of sewage treatment plants.

In case where the above mentioned plants are used on board the INS, and if they are subject to surveys, the applicable provisions specified in 2.2.2, Part III "Survey of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for Equipment of Sea-Going Ships" of the Guidelines on Technical Supervision of Ships in Service shall be met.

6.3.1 Holding tanks for sewage and domestic waste water.

6.3.1.1 General.

6.3.1.1.1 Paragraph 6.3.1 sets the requirements for holding tanks for sewage and domestic waste water and their associated equipment and piping.

The summarized scope of holding tank surveys during special surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

6.3.1.1.2 During all types of surveys, the technical condition of cable routing of the visual and audible alarm operating in case of 80 % filling of the tank shall be checked.

6.3.1.1.3 The extent of examinations and measurements during survey of the holding tanks may be reduced by the surveyor, in each particular case, subject to their service life, the results of the previous surveys and repairs made.

6.3.1.2 Initial survey.

6.3.1.2.1 The scope of holding tanks survey at initial survey of a ship shall be determined proceeding from the scope of special survey of the ship, subject to its age, having regard to the potential reduction of the survey scope provided that the documents of the Registers or other recognized competent supervisory bodies are available.

6.3.1.2.2 The compliance of the capacity, design of the holding tanks with the approved technical documentation, having regard to the number of persons allowed on board, operational conditions of the ship, availability of a documented agreement upon the said (capacity) calculation with the customer (shipowner) shall be checked.

6.3.1.2.3 Hydraulic test of the holding tanks and associated piping shall be carried out in compliance with 6.3.1.3.4 and 6.3.1.3.5.

Operational testing of holding tanks shall be carried out in compliance with 6.3.1.3.6 to 6.3.1.3.9.

6.3.1.3 Special survey.

6.3.1.3.1 During special survey, the compliance of the holding tanks and associated pipelines with the requirements of the Rules for INS Construction shall be checked, and their technical condition shall be assessed.

6.3.1.3.2 During special survey, the holding tanks and their associated equipment and piping shall be submitted for examination with free access and opening-up being provided.

Prior to internal examination, the holding tanks shall be thoroughly treated, washed and disinfected.

An appropriate document (report) on disinfection of holding tanks shall be submitted to the surveyor.

The condition of inter surfaces of holding tanks, availability of arrangements for flushing and steaming, as well as of arrangements for sediment resuspension, if any, shall be checked.

Availability and technical condition of air pipes shall be checked.

Availability of the visual and audible alarm detectors operating in case of 80 % filling of the tank, shall be checked.

6.3.1.3.3 The holding tanks shall be tested by a test pressure equal to 1,5 times the water column pressure measured from the tank bottom to the lower toilet bowl not provided with a shut-off device in the discharge line, but not less than 25 kPa.

The holding tanks shall be considered to have passed the hydraulic test, if no leakages in welds and joints are found.

6.3.1.3.4 Pipelines serving holding tanks shall be tested by a test pressure equal to 1,5 times the working pressure. The test pressure may be reduced by the surveyor depending on the pipeline purpose.

The pipelines shall be considered to have passed the hydraulic test, if no leakages in pipe welds and joints are found.

6.3.1.3.5 The operational testing of holding tanks shall be carried out together with their associated equipment and piping serving the holding tanks.

6.3.1.3.6 The operational testing of holding tanks shall be carried out with sea water, or if the survey conditions permit, by sewage.

6.3.1.3.7 During operational testing of the holding tanks and their equipment for serviceability at all types of survey, the following shall be checked:

visual and audible alarm operating in case of 80 per cent filling of the tank (simulation method may be applied);

operation of ventilation system of the space if the holding tank (tanks) is (are) located in a separate space;

operation of the arrangements for flushing with water and steaming, as well as of the arrangements sediment resuspension (if any);

free fall of the effluent to the holding tanks.

6.3.1.3.8 During operational testing of the holding tanks and their equipment, the simulation methods may be used, if they ensure adequate effectiveness of such testing.

6.3.2 Sewage and domestic waste water discharge systems.

6.3.2.1 General.

6.3.2.1.1 Paragraph 6.3.2 sets the requirements for sewage and domestic waste water discharge systems and their pumps, ejectors and other associated equipment.

The summarized scope of surveys of the sewage and domestic waste waters discharge systems (hereinafter referred to as "the systems") during periodical surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

6.3.2.1.2 During all types of surveys, the technical condition of electrical equipment, cabling and alarm systems shall be checked.

6.3.2.1.3 The extent of examinations and measurements during survey of the systems may be reduced by the surveyor, in each particular case, subject to the service life, the results of the previous surveys and repairs made.

6.3.2.2 Initial survey.

6.3.2.2.1 The scope of initial survey of the system at initial survey of a ship shall be determined proceeding from the scope of special survey of the ship subject to its age, having regard to the potential reduction of the survey scope, provided that the documents of the Registers or other recognized competent supervisory bodies are available.

6.3.2.2.2 The hydraulic test of piping and valves shall be carried out in compliance with 6.3.2.3.4.

6.3.2.2.3 The operational testing of the system shall be carried out in compliance with 6.3.2.3.6 to 6.3.2.3.8.

6.3.2.3 Special survey.

6.3.2.3.1 During special survey, the compliance of the system with the requirements of the Rules for INS Construction, as well as technical condition of the system and its associated equipment including sewage pumps and ejectors shall be checked.

6.3.2.3.2 Prior to survey, the diagram of pipelines of systems for collection, accumulation and discharge of sewage and domestic waste water, including the pipelines for discharge overboard within the areas of permitted discharge shall be submitted to the surveyor.

During special survey, the thorough examination of the system shall be carried out, providing, where necessary, the dismantling, opening-up or disassembling, including piping, valves and filters (if any).

On the surveyor's request, sewage pumps (and also ejectors, if the surveyor considers it is necessary) shall be dismantled for their thorough examination and for assessment of their technical condition.

The bottom, side and watertight bulkhead valves located below the waterline shall be subject to thorough examination during survey in dry dock.

The piping, valves and other equipment of the system, and also sewage pumps and ejectors if they are subject to examination in knocked-down condition shall be cleaned, washed and disinfected.

Disinfection of piping, valves and other equipment, and also of sewage pumps and ejectors if they are subject to examination in knocked-down condition shall be confirmed in the relevant document (report) submitted to the surveyor.

6.3.2.3.3 When the system is submitted for thorough examination, an access for examination of piping and valves with removal of casings, sheathing and, where necessary, pipe insulation shall be provided.

6.3.2.3.4 The pipeline and valves shall be subjected to testing by a test pressure equal to 1,5 times the working one. The test pressure may be reduced, at the surveyor's discretion, depending on the pipeline purpose and its technical condition.

Pipelines shall be considered to have passed the test, if no leakages in pipe welds and joints are found.

The availability and location of the pipeline for discharge of sewage and domestic waste water to reception facilities, including location of discharge manifolds with standard discharge connections shall be checked in compliance with the requirements of the Rules for INS Surveys.

6.3.2.3.5 Operational testing of the system shall be carried out together with sewage pumps, ejectors and other associated equipment.

6.3.2.3.6 The operational testing of the system shall be carried out with sea water or, if the survey conditions permit, by sewage.

The operational testing of the system shall be carried out to the extent subject to the type of survey.

6.3.2.3.7 During operational testing of the system for serviceability at all types of survey, the following shall be checked:

pumps and ejectors (if any). During survey, the pumps and ejectors may be checked by short-time starting;

means for remote stopping of discharge provided at the observation position in the vicinity of manifolds for the discharge of sewage, or operation of the positive communication (such as telephone or radio system) between the observation position and discharge control position;

possibility of sealing the stop valves of the pipelines for the discharge.

6.4 SURVEY OF EQUIPMENT FOR PREVENTION OF POLLUTION BY GARBAGE

This Chapter does not contain any requirements for survey of incinerators and garbage processing devices (garbage comminuters, compactors).

In case where the above mentioned equipment and arrangements are used on board the ship, and if they are subject to surveys, the applicable provisions specified in 2.2.4, Part III "Surveys of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for Equipment of Sea-Going Ships" of the Guidelines on Technical Supervision of Ships in Service shall be met.

6.4.1 Garbage receptacles.

6.4.1.1 Paragraph 6.4.1 sets the requirements for the garbage receptacles (hereinafter referred to as "the receptacles").

The summarized scope of receptacles surveys is given in Table 1.3, Part II "Survey Schedule, Scope and Procedure".

6.4.2 Initial survey.

6.4.2.1 During initial survey, the compliance of the receptacles design and installation with the requirements of the Rules for INS Construction and with the manufacturer's certificates shall be checked.

The technical condition of the receptacles shall be assessed.

6.4.2.2 The calculation of the receptacles required capacity for the appropriate types of garbage and its approval by the customer (shipowner) shall be checked.

6.4.2.3 The receptacles survey shall be carried out in the scope of special survey.

6.4.3 Intermediate survey.

6.4.3.1 During intermediate survey, the compliance of the receptacles with the approved technical documentation shall be checked, and the changes in their technical condition shall be identified.

6.4.3.2 The availability of the documentation listed in 6.4.2.2 shall be checked.

6.4.3.3 During intermediate survey the receptacles shall be subjected to external examination.

In this case, the following shall be checked:

availability, condition and arrangement of the receptacles and the compliance with the records made in the ship documents;

availability of marking clearly indicating the type of garbage collected in the receptacles;

availability of covers (closures) and cover sealing;

condition of appliances for reliable securing of the removable receptacles (containers) to the deck.

6.4.4 Special survey.

6.4.4.1 During special survey, the compliance of the receptacles with the requirements of the Rules for INS Construction shall be checked, and their technical condition shall be assessed.

The availability and condition of the documentation listed in 6.4.2.2 shall be checked.

6.4.4.2 During special survey, the receptacles shall be subjected to external examination to the extent specified in 6.4.3.

In addition, the tightness of covers of the removable receptacles (containers) shall be checked.

6.4.4.3 The performance of procedure for storing of garbage on board the ship, the space allocated for the purpose of storage, if applicable, its ventilation and fire-fighting equipment shall be checked.

7 SURVEY OF SHIPS CARRYING DANGEROUS GOODS IN COMPLIANCE WITH THE PROVISIONS OF THE EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS (ADN)

7.1 GENERAL

7.1.1 The European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) has been prepared by the United Nations Economic Commission for Europe (UNECE) in collaboration with the Central Commission for the Navigation on the Rhine (CCNR) with a view to establishing uniform principles and rules for international carriage of dangerous goods by inland waterways.

The ADN, since the entry into force, has replaced the European Provisions concerning the International Carriage of Dangerous Goods, previously in force, annexed to Resolution No. 223 of the Inland Transport Committee of the Economic Commission for Europe.

The Regulations annexed to the ADN (ADN Regulations) are an integral part thereof. Any reference to the ADN means the reference to the annexed Regulations to the ADN.

7.1.2 Technical instructions of the ADN Regulations concerning the requirements for the equipment and construction of dry cargo ships and oil tankers have been included into the Rules for INS Construction, and may be applied to the contracts for construction of ships intended for the carriage of dangerous goods.

7.1.3 When the shipowners apply for issuing the documents (certificates of approval) permitting ships in service the carriage of dangerous goods on the Danube, the RS Branch Offices shall be guided by transitional measures specified in 1.6, Part I "General Provisions" of the ADN Regulations to be met by the existing ships in service not complying with the requirements of the ADN Regulations to the full extent.

7.1.3.1 For tankers intended for the carriage of dangerous goods in bulk on the Danube, the hull structure shall comply with the ADN Regulations. For tankers intended for the carriage of dangerous goods in bulk apart from the Danube on other European rivers, the hull structure shall comply with the Regulations for the Carriage of Dangerous Substances in the Rhine (ADNR).

Ships' construction, equipment and arrangements for the carriage of noxious liquid substances in bulk depending on the name of cargo carried, as well as vegetable oil in bulk specified in Part XI "Summary of Technical Requirements" of the Rules for the Classification and Construction of Chemical Tankers shall comply at least with the provisions of the ADN Regulations and the Rules for the Classification and Construction of Chemical Tankers, as applicable.

7.1.3.2 The ADN Regulations provide for certificates of approval to be kept on board ships (provisional certificates of approval according to 1.16.1.3.1 of the ADN Regulations), which shall be in accordance with the models prescribed by the ADN Regulations (refer to 7.1.4 of the present Rules). In accordance with 1.16.2 of the ADN Regulations, the certificates of approval or provisional certificates of approval shall be issued by the competent authority as defined in the ADN Regulations or upon its authorization by the inspection body referred to in 1.16.4 of the ADN Regulations. The Certificate of approval and Provisional certificate of approval shall be complemented by an annex according to the model prescribed by the ADN Regulations (in RS — form 2.1.52). The list of documents to be kept on board is specified in 8.1.2 of the ADN Regulations.

7.1.3.3 The ADN Regulations provide also for additional measures to be taken and additional conditions to be met (refer to 8.1.4 — 8.1.11 of the ADN Regulations).

7.1.4 The Register received recognition of the following Contracting Parties to the ADN: Austria, Hungary, Republic of Moldova, Russian Federation, Romania and Slovakia, which gives the Register the right to act within the framework of the ADN as a recognized classification society.

7.1.4.1 On receipt of the request the RS Branch Office shall notify RHO and receive all necessary instructions on the survey procedure and issuance of the Provisional certificate of approval considering

provisions in 1.8 and 1.16 of Part I "General Provisions", applicable provisions of Parts VII — IX of the ADN Regulations.

7.1.4.2 Where applicable, in case of satisfactory results of the survey, the relevant (permanent/provisional) Certificate of approval shall be issued to a ship in compliance with the RS internal procedures (for example, in accordance with the ADN Regulations, the Certificate forms 2.1.50, 2.1.50.1, 2.1.51, 2.1.51.1 shall apply).

The Certificate of approval shall be supplemented with a list of all the dangerous goods accepted for carriage in the ship (ship substance list) (refer to 1.16.1.2.5 of the ADN Regulations). The Certificate of approval may be issued on the basis of the survey report including all necessary information to issue the Certificate (refer to 1.16.3 of the ADN Regulations for the survey procedure requirements and the survey report content).

The documents specified in 8.1.2 of the ADN Regulations shall be available onboard the ship.

7.1.4.3 In order to obtain the Certificate of approval, the owner shall send the appropriate request to the competent authority referred to in 1.16.2.1 of the ADN Regulations. The competent authority shall specify the documents to be submitted. To obtain the Certificate of approval, at least the following documents shall be attached to the request: valid certificate for inland navigation, the survey report referred to in 1.16.3.1 of the ADN Regulations and the certificate referred to in 9.1.0.88.1, 9.2.0.88.1, 9.3.1.8.1, 9.3.2.8.1, 9.3.3.8.1 of the ADN Regulations (refer to 1.16.5 of the ADN Regulations).

7.1.4.4 Regarding amendments to the Certificate of approval — refer to 1.16.6 of the ADN Regulations.

7.1.4.5 The owner shall submit the ship for survey appropriately prepared (refer to the Rules for Classification Surveys of Ships in Service and 1.16.7 of the ADN Regulations). They shall be required to provide such assistance as may be necessary for the survey, such as providing a suitable launch and personnel, and uncovering those parts of the hull of installations which are not directly accessible or visible. In the case of an initial, special or periodical surveys, the RS may require a dry dock survey.

7.1.4.6 If a ship does not yet have the Certificate of approval or its validity period expired more than 12 months ago, the ship shall undergo an initial survey.

7.1.4.7 If the ship's hull or equipment has undergone alterations liable to diminish safety in respect of the carriage of dangerous goods, or has sustained damage affecting such safety, the ship shall be presented without delay by the owner for further survey.

7.1.4.8 To renew the Certificate of approval, the owner shall present the ship for a periodical survey. If the request for a periodical survey is made during the last year preceding the expiry of the validity of the Certificate of approval, the period of validity of the new certificate shall commence when the validity of the preceding certificate of approval expires. The survey of a ship may be requested during a period of 12 months after the expiry of the Certificate of approval. After this period of time, the ship shall undergo an initial survey in accordance with 1.16.8 of the ADN Regulations.

The competent authority shall establish the period of validity of the new Certificate of approval on the basis of the results of the periodical survey.

7.1.4.9 The requirements for classification of ships according to the ADN Regulations are specified in 7.1.5.

7.1.4.10 Conversion/repairs/modernization to the hull shall be carried out under the supervision of the same classification society that supervised the ship's construction or reconstruction (refer to, for example, 9.1.0.88.3 of the ADN Regulations).

7.1.4.11 In the Certificate of approval for double-hull/double bottom ships complying with the additional requirements of 9.1.0.80 — 9.1.0.95 or 9.2.0.80 — 9.2.0.95 of the ADN Regulations, the competent authority (as defined in the ADN Regulations) shall make an appropriate performance record (refer to 1.16.1.2.4 of the ADN Regulations).

7.1.4.12 In case of survey of tankers, the Certificate of approval shall be supplemented by a list of all the dangerous goods accepted for carriage in the ship (ship substance list), drawn up by the Register in case the ship is classed by RS (refer to 1.16.1.2.5 of the ADN Regulations).

The classification societies, including RS, shall update the ship substance list at each class renewal survey based on the annexed ADN Regulations in force at the time. The Register shall inform the

shipowner in advance of the amendments to Table C, Chapter 3.2 of the ADN Regulations to come into force. If these amendments require an update of the ship substance list, the shipowner shall forward the relevant request to the Register. The updated ship substance list shall be issued by the Register within the period specified in 1.6.1.1 of the ADN Regulations.

The entire ship substance list shall be withdrawn by the Register within the period specified in 1.6.1.1, due to amendments to the ADN Regulations or due to changes in classification, the goods contained in it are no longer permitted to be carried in the ship.

The Register shall without delay, after issuance of the Certificate of approval, transmit a copy of the ship substance list to the authority responsible for issuing the Certificate of approval and without delay inform it about amendments or withdrawal (refer to 5.4.0.2 of the ADN Regulations regarding the electronic document).

7.1.5 Requirements for classification of ships according to the ADN Regulations.

7.1.5.1 Dry cargo ships.

7.1.5.1.1 Provisions 9.1.0.0 — 9.1.0.79 of the ADN Regulations shall apply to dry cargo ships.

7.1.5.1.2 In compliance with 9.1.0.80 of the ADN Regulations the double-hull/double bottom dry cargo ships intended to carry dangerous goods of Classes 2, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 7, 8 or 9, except those for which label No.1 is prescribed in column (5) of Table A of Chapter 3.2 of the ADN Regulations, in quantities exceeding those referred to in 7.1.4.1.1 of the ADN Regulations shall comply with the requirements in 9.1.0.88 — 9.1.0.99 of the ADN Regulations (as applicable). Such ships shall be built to the class of a recognized classification society in accordance with the rules established by that classification society to its highest class. The Register confirms this fact by the issue, endorsement and renewal of the Classification Certificate.

7.1.5.1.3 The requirements of 9.2.0.0 — 9.2.0.79 of the ADN Regulations shall apply to sea-going ships compliant with SOLAS 74 (Chapter II-2 Regulation 19 or Chapter II-2 Regulation 54). The sea-going ships non-compliant with the above requirements of SOLAS 74 shall comply with 9.1.0.0 — 9.1.0.79 of the ADN Regulations.

7.1.5.1.4 In compliance with 9.2.0.80 of the ADN Regulations the double-hull/double bottom sea-going ships intended to carry dangerous goods of Classes 2, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 7, 8 or 9, except those for which label No. 1 is prescribed in column (5) of Table A of Chapter 3.2 of the ADN Regulations, in quantities exceeding those referred to in 7.1.4.1.1 of the ADN Regulations shall comply with the requirements in 9.2.0.88 — 9.1.0.99 of the ADN Regulations (as applicable). Such ships shall be built to the class of a recognized classification society in accordance with the rules established by that classification society to its highest class. The Register confirms this fact by the issue, endorsement and renewal of the Classification Certificate.

7.1.5.2 Tankers.

7.1.5.2.1 The requirements of 9.3.1.0 — 9.3.1.99 of the ADN Regulations shall apply to tankers of Type G.

7.1.5.2.2 The requirements of 9.3.2.0 — 9.3.2.99 of the ADN Regulations shall apply to tankers of Type C.

7.1.5.2.3 The requirements of 9.3.3.0 — 9.3.3.99 of the ADN Regulations shall apply to tankers of Type N.

7.1.5.2.4 The tankers shall be built to the class of a recognized classification society in accordance with the rules established by that classification society to its highest class (refer to 9.3.1.8.1, 9.3.2.8.1 and 9.3.3.8.1 of the ADN Regulations). The ADN Regulations require maintenance of its highest class. The Register confirms this fact by the issue, endorsement and renewal of the Classification Certificate.

7.1.5.3 The Certificate of approval may be withdrawn if the ship is not properly maintained or if the ship's structure or equipment no longer complies with the applicable provisions of the ADN Regulations, or if the ship is no longer classed as the highest class ship in accordance with 9.1.0.88.1, 9.2.0.88.1, 9.3.1.8.1, 9.3.2.8.1 and 9.3.3.8.1.

7.1.5.4 The Certificate of approval for a tanker shall contain the relief pressure of the safety valves or of the high-velocity vent valves in accordance with 7.2.2.0 and 8.6.1.3 of the ADN Regulations. Where a

ship carries cargo tanks with different valve relief pressures, the relief pressure of each tank shall be indicated in the Certificate of approval.

The design and test pressures of each tank shall be indicated in Section "Note" of the Classification Certificate for tankers as per the as-built documentation (refer to 7.2.2.0.1, 9.3.1.8.1, 9.3.2.8.1 and 9.3.3.8.1 of the ADN Regulations). Where a ship carries cargo tanks with different valve relief pressures, the design and test pressures of each tank shall be indicated.

LIST OF SHIP TECHNICAL DOCUMENTATION

This Appendix contains a list of ship technical documentation necessary to verify compliance with the technical requirements and provision of appropriate indices and characteristics specified by the Rules for INS Construction at initial survey of a ship built without the Register technical supervision.

The scope of the required ship technical documentation may be reduced in case where documentation of another classification society or other competent supervisory bodies, as well as shipyard (manufacturer), which confirms compliance with the technical requirements of the Rules for INS Construction, quality of material used and workmanship, is available.

Calculations necessary for verification of compliance with the requirements of the Rules for INS Construction may be requested by the surveyor, if the documentation submitted is not sufficient to verify it. Where certificates, reports or other documents confirming that the tests required by the Rules for INS Construction have been carried out are not available, the items shall be subjected to appropriate tests.

Ship general documentation:

- .1 ship specification (may be submitted in separate parts);
- .2 information on loading and ballasting (based on strength conditions);
- .3 Stability Booklet (if required);
- .4 freeboard calculation (if requested by the surveyor);
- .5 Damage Stability Booklet (if required);
- .6 Inclining Test Report (copy of inclining test report of a sister ship);
- .7 general arrangement plan;
- .8 lines drawing;
- .9 midship section plan;
- .10 structural drawings;
- .11 shell expansion drawing;
- .12 general arrangement plan of steering gear, anchor arrangement, mooring arrangement, towing arrangement, coupling arrangement and masts with indication of the basic technical data on their equipment;
- .13 general arrangement plan of life-saving appliances with indication of the basic technical data on their equipment;
- .14 general arrangement plan of signal means with indication of their characteristics;
- .15 general arrangement plan for machinery, boilers, heat exchangers and pressure vessels in machinery spaces;
- .16 documentation on main and auxiliary machinery, gear and couplings;
- .17 circuit diagrams of control, governing, monitoring, alarm and protection systems;
- .18 torsional vibration calculation in the engine – power receiver system, as well as results of torsional vibration metering in the engine – shafting – propeller system and conclusion on their results;
- .19 documentation on shafting and propeller;
- .20 documentation on steam boilers, heat exchangers and pressure vessels;
- .21 documentation on systems and piping;
- .22 bottom-and-side valves arrangement plan;
- .23 general arrangement plans of a refrigerating plant;
- .24 circuit diagrams of refrigerant, cooling medium, cooling water systems;
- .25 general arrangement plans of essential electrical equipment and electric propulsion plant;
- .26 diagrams of power generation and distribution from the main and emergency sources of electrical power: ship's mains, lighting (up to section switchboards) and navigation lights;
- .27 diagrams and general view of main and emergency switchboards and control desks;

- .28 detailed diagrams of the main current, excitation, control, pilot, signalling, protection and interlocking of the electric propulsion plant;
- .29 circuit diagrams of outer connections of ship control, telephone communication, general alarm system, fire detection and fire alarm system;
- .30 diagrams of essential electric drives;
- .31 diagrams of lubrication and cooling systems for main electric machines;
- .32 diagrams of earthing of the protection system, calculations of lighting conductors for oil tankers, gas carriers and other non-metal ships;
- .33 drawings of dangerous zones with indication of the type of equipment protection installed therein;
- .34 calculation of necessary output of ship's electric power plant providing for the operating conditions of the ship (at the surveyor's request);
- .35 line and block diagrams of automation systems of individual plants and machinery (control, signalling, automation and protection systems);
- .36 mounting and structural drawings of automation systems and devices, sensors, alarm devices, instruments, as well as switchboards and desks of control and monitoring;
- .37 arrangement plans of radio equipment and sources of electrical power, as well as heating, ventilation, communication, signalling and lighting systems in spaces intended to accommodate radio equipment;
- .38 arrangement plans of aerials, wiring diagram of radio equipment and diagram of commutation of aerials;
- .39 calculation of VHF radio installations range;
- .40 calculation of the capacity of reserve source of electric power (accumulators) for supplying the radio installation;
- .41 list of radio equipment installed on board the ship with indication of its technical specifications and data on its approval by the Register or other competent body;
- .42 arrangement plans of navigational equipment and wiring diagrams of navigational equipment and their sources of electrical power, as well as heating, ventilation, communication, signalling and lighting systems in spaces intended to accommodate navigational equipment;
- .43 list of navigational equipment installed on board the ship with indication of its technical specifications and data on its approval by the Register or other competent body;
- .44 arrangement plan of equipment and means for prevention of pollution from ships;
- .45 calculation of the required capacity of holding tanks for oil residues, oily bilge water, sewage and domestic waste water, as well as of the required capacity of garbage receptacles;
- .46 diagrams of pipelines of systems for collection, accumulation and discharge of oil residues, oily bilge water, sewage and domestic waste water;
- .47 documentation confirming compliance of internal combustion engines with the requirements of Directive 97/68/EC, Directive 2009/46/EC or Regulation (EU) 2016/1628 (if applicable);
- .48 design justification confirming compliance of the ship's design, equipment and outfit and cargo spaces and/or open deck with the requirements for the carriage of dangerous goods by the European inland waterways;
- .49 documents according to 1.3.3, Part XIV "Requirements for Ships Carrying Dangerous Goods" of the Rules for INS Construction.

CORRESPONDENCE BETWEEN THE REQUIREMENTS OF THE RULES FOR INS CONSTRUCTION AND TRANSITIONAL PROVISIONS LAID DOWN BY ES-TRIN STANDARD IN ACCORDANCE WITH DIRECTIVE (EU) 2016/1629

For ease of reference, when determining the scope and terms of surveys for ships in service covered by the requirements of Directive (EU) 2016/1629 as amended, and not navigating on Zone R waterways, the correspondence between the requirements of the Rules for INS Construction and transitional provisions established by ES-TRIN standard in accordance with Annex II to the above mentioned Directive is given in this Appendix in a tabular form (refer to Table 2-1).

When using Table 2-1, it is necessary to take into account the following.

1. Table 2-1 is based on ES-TRIN 2019/1 applied from 1 January 2020 in accordance with Annex II to Directive (EU) 2016/1629 amended by Commission Delegated Regulation (EU) 2019/1668, as well as on the Rules for INS Construction, edition 2017. As amendments will be made in the above mentioned standard and Directive as well as the Rules for INS Construction, the Table content shall be revised with introduction of appropriate amendments.

2. Transitional provisions mentioned in Articles 33.02 and 33.03 of ES-TRIN standard apply to ships in service as follows:

2.1 the ship is operated exclusively on waterways outside the Rhine (Zone R);

2.2 the certificate for inland navigation (hereinafter referred to as "the Certificate") or another traffic license was issued for the first time by the relevant competent authorities before 30 December 2008;

2.3 the ship complies with technical requirements of Chapters 1 — 12 of Annex II to Council Directive 82/714/EEC of 4 October 1982 (hereinafter referred to as "Directive 82/714/EEC") in force on the date on which the Certificate is issued (or another traffic license);

2.4 the ship that does not fully comply with the requirements of ES-TRIN standard shall be adapted to comply with these requirements within the periods mentioned in transitional provisions of Article 33.02 of ES-TRIN standard taking measures specified therein (taking into account the additional instructions given in the instruction ESI-IV-1 of ES-TRIN standard, where applicable). Until adaptation the ship shall comply with the requirements of Chapters 1 — 12 of Annex II to Directive 82/714/EEC;

2.5 to the ship the keel of which was laid before 1 January 1985, in addition to transitional provisions of Article 33.02, the provisions of Article 33.03 of ES-TRIN standard shall apply;

2.6 the Certificate issued before 30 December 2008 remains valid until the date of expiry indicated in this Certificate. If the new Certificate is issued, the valid Certificate (or another traffic license) shall be withdrawn and the date of its issue shall be entered in the new Certificate in compliance with the instructions given in Article 33.02(1) of ES-TRIN standard, provided the navigation and crew safety is ensured.

3. The following terms and marks apply in Table 2-1:

N R C means that the provisions do not apply to ships which are already operating, unless the parts concerned are replaced or converted, i.e. the provisions apply only to Newly-built ships (N) and to the Replacement (R) or Conversion (C) of the parts or areas concerned. If existing parts are replaced by replacement parts using the same technology and of the same type, this does not constitute replacement (R) within the meaning of the transitional provisions.

Issue or renewal of the Certificate means that the provisions shall be complied with the time of the next issue or renewal of the Certificate after the date indicated.

Table 2-1

Article and paragraph of ES-TRIN 2019/1	Part, Chapter/paragraph of the Rules for INS Construction	Brief content	Deadline for fulfillment of the requirements for ships in service not navigating on Zone R waterways:	
			obtained the Certificate before 30 December 2008 (Article 33.02 of ES-TRIN 2019/1)	the keel of which was laid before 1 January 1985 (Article 33.03 of ES-TRIN 2019/1)
		CHAPTER 3. SHIPBUILDING REQUIREMENTS		
3.03 (1)(a)	P. II, Sec. 2, p. 2.7.1	Location of collision bulkhead	NRC; after 30.12.2049	NRC
3.03 (1)(b)		Location of aft-peak bulkhead	NRC; after 30.12.2049	NRC
3.03 (2)	P. III, Sec. 10, p. 10.2.1	Accommodation (forward of the collision bulkhead)	NRC; after 30.12.2024	NRC
3.03 (2)	P. III, Sec. 10, p. 10.2.1	Accommodation (aft of the aft-peak bulkhead)	NRC; after 30.12.2059	NRC
3.03 (2)		Safety equipment (forward of the collision bulkhead)	NRC; after 30.12.2029	NRC
3.03 (2)		Safety equipment (aft of the aft-peak bulkhead)	NRC; after 30.12.2049	NRC
3.03 (4)	P. III, Sec. 10, p. 10.2.2	Gastight separation	NRC; after 30.12.2024	
3.03 (5) (first paragraph)	P. II, Sec. 2, p. 2.7.1	Openings in watertight bulkheads		NRC
3.03 (5) (second paragraph)	P. III, Sec. 9, p. 9.6.2	Monitoring of doors in aft-peak bulkhead	NRC; after 30.12.2024	
3.03 (7)	P. III, Sec. 3, p. 3.1.16	Anchors not protruding in foresections of ships	NRC; after 30.12.2024	NRC
3.04 (2)		Bunker surface		NRC
3.04 (3) (second sentence)	P. VI, Sec. 4, p. 4.6.1	Insulation material used in engine rooms	NRC; at the latest — on renewal of the Certificate	
3.04 (3) (third and fourth sentence)		Openings and locking devices	NRC; at the latest — on renewal of the Certificate	
3.04 (6)	P. VI, Ch. 1.2 and 4.5	Exits of engine rooms	NRC; after 30.12.2049	
3.04 (7)		Maximum permissible sound pressure level in the engine rooms		NRC
		CHAPTER 4. SAFETY CLEARANCE, FREEBOARD AND DRAUGHT MARKS		
4.01 (1)	P. IV, Sec. 4, Ch. 4.5	Permissible safety clearance		NRC; after 30.12.2019
4.02	P. IV, Sec. 4, Ch. 4.4	Freeboard		NRC
4.04	P. IV, Sec. 4, Ch. 4.2 and 4.3	Draught marks	NRC; after 30.12.2024	
		CHAPTER 5. MANOEUVRABILITY		
5.06 (1) (first sentence)	P. VI, Sec. 2, pp. 2.1.1 and 2.1.5	Minimum speed	NRC; after 30.12.2049	
		CHAPTER 6. STEERING SYSTEM		
6.01 (1)	P. III, Sec. 2, p. 2.1.1; and P. VI, Sec. 2, p. 2.1.1; Sec. 3, p. 3.1.3	Manoeuvrability required by Ch.5 of ES-TRIN 2019/1	NRC; after 30.12.2049	
6.01 (3)	P. III, Sec. 2, p. 2.1.1; P. VI, Sec. 2, Ch. 2.2	Permanent lists and ambient temperatures	NRC; after 30.12.2024	NRC
6.01 (7)	P. III, Sec. 2, p. 2.4.10	Design of rudder stocks	NRC; after 30.12.2029	
6.02 (1)	P. VIII, Sec.7, p. 7.1.2	Separate hydraulic tanks	NRC; after 01.01.2026	
6.02 (1)		Duplicated pilot valves in case of hydraulic steering apparatus drive unit	NRC; after 01.01.2026	
6.02 (1) and (2)		Separated pipework for the second drive unit in case of hydraulic steering apparatus drive unit	NRC; after 01.01.2026	
6.02 (3)	P. III, Sec. 2, p. 2.1.1	Manoeuvrability required by Ch.5 of ES-TRIN 2019/1 ensured by second drive unit/manual drive	NRC; after 30.12.2049	
6.03 (1)		Connection of other power consumers to the hydraulic steering apparatus drive unit	NRC; after 01.01.2026	
6.05 (1)	P. III, Sec. 2, p. 2.9.9 or P. VIII, p. 6.2.2	Wheel of manual drive not driven by powered drive unit	NRC; after 30.12.2024	

Article and paragraph of ES-TRIN 2019/1	Part, Chapter/paragraph of the Rules for INS Construction	Brief content	Deadline for fulfillment of the requirements for ships in service not navigating on Zone R waterways:	
			obtained the Certificate before 30 December 2008 (Article 33.02 of ES-TRIN 2019/1)	the keel of which was laid before 1 January 1985 (Article 33.03 of ES-TRIN 2019/1)
6.06 (1) 6.07 (2)(a) 6.07 (2)(e) 6.08 (1)		Two independent actuation systems Level alarm and alarm of the service pressure of the hydraulic tanks Monitoring of buffer devices Requirements for electrical equipment according to Article 10.20 of ES-TRIN 2019/1	NRC; after 30.12.2029 NRC; after 30.12.2024 NRC; at the latest — on the date of issue of the Certificate NRC; after 30.12.2029	
7.01 (2) 7.02 (2) — (6) 7.02 (3), second paragraph 7.02 (6) 7.02 (6)	P. XII, Sec. 3, p. 3.1.2 P. III, Sec. 10, pp. 10.8.1 — 10.8.5 P. III, Sec. 10, p. 10.8.1.2 P. III, Sec. 10, p. 10.8.1 P. XII, Sec. 3, p. 3.1.10	CHAPTER 7. WHEELHOUSE Sound pressure generated by the ship Unobstructed view from the wheelhouse, except the following sections: a) unobstructed view in the helmsman's usual axis of vision; b) minimal light transmission of glazing; c) minimal light transmission of glazing (for ships with tinted glazing satisfying conditions specified in transitional provisions to Article 7.02(6) according to Article 33.02 of ES-TRIN 2019/1)	NRC; after 01.01.2049 NRC; after 30.12.2029 NRC; after 01.01.2024 NRC	NRC
7.02 (6) 7.03 (7) 7.03 (8) 7.04 (1) 7.04 (2)	P. XII, Sec. 3, p. 3.1.10 P. X, Sec. 2, pp. 2.10.4 — 2.10.7 P. X, Sec. 2, pp. 2.1.5, 2.2.2 and 2.10.10 P. XII, Sec. 3, p. 3.1.12 P. XII, Sec. 3, p. 3.1.21	Safety glass design Shutdown of alarms Automatic switch to alternative power supply Control of main engines and steering systems Control of main engines unless wheelhouses have been designed for radar navigation by one person:	NRC NRC; at the latest — on renewal of the Certificate NRC; after 30.12.2024 NRC; at the latest — on renewal of the Certificate NRC; after 30.12.2049 NRC; after 30.12.2024 NRC; after 30.12.2024 NRC; after 30.12.2024	
7.04 (3) 7.04 (9) (third sentence) 7.04 (9) (fourth sentence) 7.05 (1)	P. XII, Sec. 3, p. 3.1.22 P. XII, Sec. 3, p. 3.1.21	Display, unless wheelhouses have been designed for radar navigation by one person Control by a lever in the active steering systems Prohibition of indicating the direction of the jet in the active steering systems	NRC; after 30.12.2024 NRC; after 30.12.2024 NRC; after 30.12.2024	
7.05 (2) 7.06 (1)	P. IX, Sec. 6, Ch. 6.7	Navigation lights that fulfill the requirements for colour and light of lights on board, and the admission of navigation lights for navigation on the Rhine as of 30 November 2009 Monitoring of navigation lights Radar navigation installations and rate-of-turn indicators which: a) have been approved and installed pursuant to a Member State's regulations before 31 December 2012; b) have received an approval on or after 1 January 1990, pursuant to the minimum requirements and test conditions for radar installations used for navigation on the Rhine and the minimum requirements if there is a valid installation certificate pursuant to ES-TRIN 2019/1, Directive 2006/87/EC or Resolution CCNR 1989-35;	deadline is not specified (may still be used) after 30.12.2018 deadline is not specified (may be installed and still be used)	at the latest — on renewal of the Certificate

Article and paragraph of ES-TRIN 2019/1	Part, Chapter/paragraph of the Rules for INS Construction	Brief content	Deadline for fulfillment of the requirements for ships in service not navigating on Zone R waterways:	
			obtained the Certificate before 30 December 2008 (Article 33.02 of ES-TRIN 2019/1)	the keel of which was laid before 1 January 1985 (Article 33.03 of ES-TRIN 2019/1)
7.06 (3) 7.06 (3)	P. IX, Sec. 7, Ch. 7.3	c) have received an approval on or after 31 December 2006, pursuant to the minimum requirements and test conditions of the Directive 2006/87/EC, if there is a valid installation certificate pursuant to ES-TRIN 2019/1, or Directive 2006/87/EC; d) have an approval on or after 1 December 2009, pursuant to the minimum requirements and test conditions of the Resolution CCNR 2008-II-11, if there is a valid installation certificate pursuant to ES-TRIN 2019/1 or Resolution CCNR 2008-II-11 Inland AIS equipment Inland AIS equipment which has received an approval on or after 19 October 2012, pursuant to the requirements of the Test Standard for Inland AIS, Edition 2.0, adopted by Resolution CCNR 2012-II-20	deadline is not specified (may be installed and used) deadline is not specified (may be installed and used) NRC Before 07.10.2018	
7.09 7.12 7.12 (4) (second sentence) 7.12 (5) 7.12 (7) (first and second sentence) 7.12 (7) (third sentence) 7.12 (8) 7.12 (12)(c)	P. III, Sec. 6, pp. 6.3.2 and 6.3.5	Alarm system Elevating wheelhouses Elevating wheelhouses: a) indications; b) stopping, locking and automatic deactivation; c) arrangements and protection features; d) optical signal; e) emergency lowering system; f) tests and surveys before being put back into service after any major conversion or repair as well as regularly, at least every five years	NRC; after 30.12.2024 NRC; at the latest — on renewal of the Certificate NRC; after 01.01.2025 NRC; after 01.01.2025 NRC; at the latest — on renewal of the Certificate NRC; after 01.01.2040 NRC; at the latest — on renewal of the Certificate	NRC
8.01 (3)	P. VI, Sec. 1, p. 1.1.2	CHAPTER 8. ENGINE DESIGN Only internal-combustion engines burning fuels having a flashpoint of more than 55 °C	NRC; after 30.12.2029	NRC
8.02 (1) 8.02 (4) 8.02 (5) 8.02 (6)	P. VIII, Sec. 1, p. 1.5.10.1	Securing of engines against unintentional starting Screening of pipe connections Jacketed piping system Insulation of engine parts	NRC; after 30.12.2024 NRC; after 30.12.2024 NRC; after 30.12.2024 NRC; at the latest — on renewal of the Certificate	
8.03 (2) 8.03 (4) 8.03 (5)	P. VI, Sec. 3, p. 3.2.1 P. VIII, Sec. 1, pp. 1.5.10.3 and 1.5.10.4 P. VI, Sec. 5, pp. 5.2.15 — 5.2.18	Monitoring devices Automatic protection against overspeed, its indication and switch off Design of shaft bushings	NRC; after 30.12.2024 NRC; after 30.12.2024 NRC; after 30.12.2029	
8.04	P. VII, Sec. 10, Ch. 10.1	Engine exhaust system		NRC; at the latest — on renewal of the Certificate
8.05 (1) 8.05 (2)	P. VII, Sec. 12, p. 12.7.1 P. VII, Sec. 9, pp. 9.6.1 — 9.6.4	Steel tanks for liquid fuels Automatic closing of tank valves	NRC; after 30.12.2029 NRC; at the latest — on renewal of the Certificate	

Article and paragraph of ES-TRIN 2019/1	Part, Chapter/paragraph of the Rules for INS Construction	Brief content	Deadline for fulfillment of the requirements for ships in service not navigating on Zone R waterways:	
			obtained the Certificate before 30 December 2008 (Article 33.02 of ES-TRIN 2019/1)	the keel of which was laid before 1 January 1985 (Article 33.03 of ES-TRIN 2019/1)
8.05 (3)	P. VII, Sec. 12, p. 12.7.6	No fuel tanks located forward of the collision bulkhead	NRC; after 30.12.2024	
8.05 (3)		No fuel tanks aft of the aft-peak bulkhead	NRC; after 30.12.2049	
8.05 (4)	P. VI, Sec. 4, p. 4.3.2	No fuel tanks and their fittings above engines or exhaust pipes. Until the specified deadline, appropriate devices shall ensure the safe evacuation of fuels	NRC; after 30.12.2024	
8.05 (6) (from third till fifth sentence)	P. VII, Sec. 9, pp. 9.1.1, 9.1.10 and 9.1.17	Installation and measurements of breather pipes and connection pipes	NRC; after 30.12.2024	
8.05 (7) (first sentence)	P. VII, Sec. 12, p. 12.2.4	Quick-closing valve on the tank operated from deck, even when the rooms in question are closed	NRC; after 30.12.2029	
8.05 (9) (second sentence)	P. VII, Sec. 9, p. 9.6.2	Protection of glass gauges	NRC; after 30.12.2024	
8.05 (13)	P. VII, Sec. 9, p. 9.4.7 and Ch. 9.5	Filling level control not only for main engines but also other engines needed for safe operation of the ship	NRC; after 30.12.2029	NRC
8.06	P. VII, Sec. 13, Ch. 13.3	Storage of lubricating oil, pipes and accessories	NRC; after 30.12.2049	
8.07	P. VII, Sec. 13, Ch. 13.3	Storage of oils used in power transmission systems, control and activating systems and heating systems, pipes and accessories	NRC; after 30.12.2049	
8.08 (2)	P. VII, Sec. 6, pp. 6.1.1 and 6.1.2	Equipment with bilge pumps		NRC
8.08 (3) and (4)	P. VII, Sec. 6, pp. 6.1.6 and 6.2.1 — 6.2.4	Diameter and minimum pumping capacity of bilge pumps		NRC
8.08 (5)	P. VII, Sec. 6, p. 6.1.5	Self-priming bilge pumps		NRC
8.08 (6)	P. VII, Sec. 6, p. 6.3.10	Equipment with bilge suctions and arrangement thereof		NRC
8.08 (7)	P. VII, Sec. 6, p. 6.10.3	Automatically closable fitting for aft peak		
8.08 (8)	P. VII, Sec. 7, p. 7.3.3	Simple closing devices not sufficient for connection of ballast spaces to drainage pipes for holds capable of carrying ballast	NRC; after 30.12.2024	
8.08 (9)	P. VII, Sec. 9, p. 9.6.1	Gauging devices in hold bilges	NRC; after 30.12.2024	
8.09 (2)	P. XIII, Sec. 2, Ch. 2.5	Installations for the collection of oily water and used oil stores	NRC; after 30.12.2024	
8.10 (2)	P. VI, Sec. 2, p. 2.5.2	Noise emitted by ship		NRC
8.08 (3)		Emission limit of 65 dB(A) for stationary ship	NRC; after 30.12.2029	
CHAPTER 9. EMISSION OF GASEOUS AND PARTICULATE POLLUTANTS FROM INTERNAL COMBUSTION ENGINES				
For engines which are already installed onboard and non type-approved or for which no installation test had to be carried out after installation on board, only provisions of Article 9.02 of ES-TRIN 2019/1 apply.				
For engines which are type-approved and complying with the installation test provisions in force at the date of installation, the following requirements shall apply:				
9.02 (1) — (4) 9.06		General provisions	NR	
		Installation test	NR	

Article and paragraph of ES-TRIN 2019/1	Part, Chapter/paragraph of the Rules for INS Construction	Brief content	Deadline for fulfillment of the requirements for ships in service not navigating on Zone R waterways:	
			obtained the Certificate before 30 December 2008 (Article 33.02 of ES-TRIN 2019/1)	the keel of which was laid before 1 January 1985 (Article 33.03 of ES-TRIN 2019/1)
10.01 (1) (second sentence)	P. IX, Sec. 1, Ch. 1.4	CHAPTER 10. ELECTRICAL EQUIPMENT Relevant documents to be submitted to the inspection body	NRC; after 30.12.2049	
10.01 (2)	P. IX, Sec. 1, Ch. 1.4	Certificates for electrical equipment		NRC
10.01 (2)(b)	P. IX, Sec. 1, Ch. 1.4	Switching diagrams for main, emergency and distribution switchboards to be kept on board	NRC; after 30.12.2024	
10.01 (2)(e)		Electric propulsion plant documentation as well as switchboard diagrams	NRC; after 30.12.2030	
10.01 (2)(f)		Diagrams for electronic systems	NRC; after 01.01.2030	
10.01 (2)(g)		Control circuit diagrams	NRC; after 01.01.2030	
10.01 (3)	P. IX, Sec. 2, p. 2.1.1.1	Ambient inside and deck temperatures	NRC; after 30.12.2024	NRC
10.02	P. IX, Sec. 3, pp. 3.1.1 — 3.1.3, 3.1.5 and 5.5.2	Electricity supply systems	NRC; after 30.12.2024	
10.03	P. IX, Sec. 2, p. 2.4.4	Protection against physical contact, intrusion of solid objects and the ingress of water	NRC; after 30.12.2029	
10.04		Protection from explosion	NRC; after 01.01.2022	
10.05 (4)	P. IX, Sec. 2, p. 2.5.3.2	Cross-section of earthing conductors	NRC; after 30.12.2029	
10.06	P. IX, Sec. 4, Ch. 4.2	Maximum permissible voltages		NRC
10.06 (1) (Table)		Maximum permissible voltages of three-phase alternating current	NRC; after 01.01.2025	
10.08 (1)		Compliance of shoreside power supply systems with European Standards EN 15869-1, EN 15869-3 and EN 16840	NRC; after 01.01.2025	
10.08 (9)	P. IX, Sec. 3, Ch. 3.2	Connection and disconnection when the line is dead	NRC; after 01.01.2030	
10.10		Generators, motors and transformers		NRC
10.10 (2)		Installation of transformers	NRC; after 01.01.2025	
10.10 (3)		Insulation of primary and secondary windings of transformers	NRC; after 01.01.2050	
10.10 (4)		Tappings on the secondary windings of transformers	NRC; after 01.01.2050	
10.10 (5)		Plate with manufacturer and power of engines, generators, transformers (except for engines, which come under Chapter 9 of ES-TRIN 2019/1 or Regulation (EU) 2016/1628)	NRC	
10.11 (3) and (5)	P. IX, Sec. 13, Ch. 13.2	Installation of accumulators		NRC
10.11 (3) and (7)	P. IX, Sec. 13, Ch. 13.4 taking into account P. VII	Effective ventilation when accumulators are installed in a closed room, cabinet or chest	NRC; at the latest — on renewal of the Certificate	
10.11 (12)		Charging devices	NRC; after 01.01.2025	
10.11 (13)		Automatic chargers	NRC; after 01.01.2025	
10.11 (14)		Maximum charging voltage	NRC; after 01.01.2025	
10.11 (15)		European Standards EN 62619 and EN 62620 for lithium-ion accumulators	NRC; after 01.01.2025	
10.11 (16)		Accumulator management system	NRC; after 01.01.2025	
10.12 (1), (2), (3)(a) and (4)		Switch gear and control gear	NRC; after 30.12.2029	
10.12 (2)		Switches, protective devices		NRC
10.12 (3)(b)		Earth detection device capable of giving both visual and audible alarm	NRC; after 30.12.2024	
10.13	P. IX, Sec. 5, p. 5.7.1	Emergency circuit breaker	NRC; after 30.12.2029	
10.14 (1), (2) and (4)		Installation fittings		R.C., after 01.01.2015
10.14 (3)	P. IX, Sec. 6, p. 6.4.2	Simultaneous switching		NRC
10.14 (3) (second sentence)	P. IX, Sec. 6, p. 6.4.1	Prohibition of single-pole switches in laundries, bathrooms, washrooms and other rooms with wet facilities	NRC; after 30.12.2024	

Article and paragraph of ES-TRIN 2019/1	Part, Chapter/paragraph of the Rules for INS Construction	Brief content	Deadline for fulfillment of the requirements for ships in service not navigating on Zone R waterways:	
			obtained the Certificate before 30 December 2008 (Article 33.02 of ES-TRIN 2019/1)	the keel of which was laid before 1 January 1985 (Article 33.03 of ES-TRIN 2019/1)
10.15 10.15 (2) 10.15 (10) 10.15 (11) 10.15 (12)	P. IX, Sec. 16 P. IX, Sec. 16, p. 16.8.1.2	Cables Minimum cross-section of 1,5 mm ² per cable Cables connected to elevating wheelhouses Cable harness penetrations Cables from an emergency electrical power source to consumer equipment	NRC; after 30.12.2024 NRC; after 30.12.2024 NRC; after 01.01.2025 NRC; after 01.01.2025	NRC
10.15 (13) 10.15 (14)		Cable in areas with high ambient temperatures Installation of main and emergency power supply cables	NRC; after 01.01.2025 NRC; after 01.01.2025	
10.16 (3) 10.16 (3) (second sentence) 10.17	P. IX, Sec. 6, Ch. 6.6 P. IX, Sec. 6, p. 6.2.3 P. IX, Sec. 6, pp. 6.7.1 and 6.7.4	Lighting in engine rooms Second circuit Navigation lights	NRC; after 01.01.2029	NRC
10.18 (1)		Electronic equipment of power systems: Separate device for disconnecting from the mains for each system	NRC; after 01.01.2025	
10.18 (2)		Accessibility for repairs and measurements	NRC; after 01.01.2050	
10.18 (3)		Galvanic separation of control and power circuits	NRC; after 01.01.2025	
10.18 (4)		Safe operating with voltage and frequency variations	NRC; after 01.01.2022	
10.18 (5)		Discharge time when disconnected from mains	NRC; at the latest — on renewal of the Certificate	
10.18 (6)		Response upon failure of external control signals	NRC; after 01.01.2022	
10.18 (7)		Response upon failure of control voltages	NRC; after 01.01.2022	
10.18 (8)		Error detection and prevention of undetected errors	NRC; after 01.01.2022	
10.18 (9)		Monitoring	NRC; after 01.01.2022	
10.18 (10)		Type approval	NRC	
10.19	P. X, Sec. 2, pp. 2.10.4 — 2.10.8 and 2.11.2 — 2.11.5	Alarm and safety systems for mechanical equipment	NRC; after 01.01.2029	
10.20	P. IX, Sec. 2, pp. 2.1.1 — 2.1.3, 2.2.1	Test conditions for electronic equipment	NRC; after 30.12.2049	
10.21		Electromagnetic compatibility	NRC; after 30.12.2049	
		CHAPTER 11. SPECIFIC REQUIREMENTS APPLICABLE TO ELECTRIC PROPULSION PLANTS All provisions of Chapter 11 of ES-TRIN 2019/1	NRC	
13.01 13.01 (9)	P. III, Sec. 3, Ch. 3.2	CHAPTER 13. EQUIPMENT Anchor equipment Anchor windlasses for anchors having a mass in excess of 50 kg	NRC; after 30.12.2024	NRC
13.02 (3)(a)		Certificate for mooring and other cables: a) first cable to be replaced on the ship; b) second and third cables to be replaced on the ship	NRC; after 30.12.2024 NRC; after 30.12.2029	
13.03 (1)	P. V, Sec. 6, Table 6.4	Portable fire extinguishers. European Standard at their replacement	NRC; after 30.12.2024	
13.03 (2)	P. V, Sec. 6, Table 6.4, note 2	Suitability for Class A, B and C fires (at replacement of fire extinguishers)	NRC; after 30.12.2024	
13.03 (4)	P. V, Sec. 6, p. 6.3.1	Relation of CO ₂ content and size of room (at replacement of fire extinguishers)	NRC; after 30.12.2024	
13.04	P. V, Ch. 4.6 and p. 4.1.7	Permanently installed fire-fighting systems in accommodation spaces, wheelhouses and passenger spaces	NRC; after 30.12.2049	

Article and paragraph of ES-TRIN 2019/1	Part, Chapter/paragraph of the Rules for INS Construction	Brief content	Deadline for fulfillment of the requirements for ships in service not navigating on Zone R waterways:	
			obtained the Certificate before 30 December 2008 (Article 33.02 of ES-TRIN 2019/1)	the keel of which was laid before 1 January 1985 (Article 33.03 of ES-TRIN 2019/1)
13.05	P. V, Ch. 4.5 and p. 4.1.7	Permanently installed fire-fighting systems in engine rooms, boiler rooms and pump rooms. CO ₂ fire-fighting system permanently installed before 1 October 1985 may remain in use until the issue of the Certificate, if they comply with the requirements of Article 16.03 of ES-TRIN 2019/1	after 30.12.2049	
13.07 (1)	P. III, Sec. 8, Ch. 8.4	Application of the European Standard to ship's boats (except for ship's boats specified in Article 33.04 of ES-TRIN 2019/1)	NRC; after 01.01.2029	
13.07 (1)	P. III, Sec. 8, Ch. 8.5	Ship's boats according to the European Standard		NRC
13.08 (1)		Lifebuoys according to the European Standard		NRC
13.08 (2)	P. III, Sec. 8, p. 8.2.1	Lifejackets according to the European Standard		NRC
13.08 (2)	P. III, Sec. 8, pp. 8.2.1.1.3 and 8.2.1.2	Lifejackets which are on board on 29 December 2008	NRC; after 30.12.2024	
14.02 (4)		CHAPTER 14. SAFETY AT WORK STATIONS Equipping of outer edges of decks, side decks and work stations under the following conditions: a) the outer edges of the decks, as well as work stations at a height of more than 1 m, shall be fitted with bulwarks or coamings that are at least 0,7 m height or with continuous guard rails in accordance with European Standard EN 711:1995, comprising a handrail and intermediate rails; b) side decks shall be fitted with a continuous handrail or coaming handrails as well as with a foot rail	NRC after 01.01.2015	
14.04 (1)	P. III, Sec. 10, p. 10.5.1	Clear width of side decks, if the ship's breadth does not exceed 7,30 m. For ships laid down after 31 December 1994 and for ships in service, the requirement shall apply under the following conditions: .1 where the structures related to the entire hold area are replaced, the requirements of Article 14.04 of ES-TRIN 2019/1 shall be complied with; .2 where a conversion modifying the clear width of the side deck covers the entire length of the side decks: a) the requirements of Article 14.04 of ES-TRIN 2019/1 shall be complied with when the clear width of the side deck to a height of 0,90 m or the clear width above that height, as compared to that available before the conversion shall be reduced; b) if before the conversion the clear width of the side deck to a height of 0,90 m or the clear width above that height is less than the dimensions specified in Article 14.04 of ES-TRIN 2019/1, this width shall not be reduced	NRC	
14.04 (1)		Clear width of side decks, if the ship is less than 55 m in length with stern accommodation, provided: transitional provisions to Article 14.02 (4) of ES-TRIN 2019/1 are complied with	NRC After 01.01.2015	
14.04 (1)		Clear width of side decks (except for the ships with breadth not exceeding 7,30 m and the ships of less than 55 m in length with stern accommodation)	NRC; after 01.01.2035	

Article and paragraph of ES-TRIN 2019/1	Part, Chapter/paragraph of the Rules for INS Construction	Brief content	Deadline for fulfillment of the requirements for ships in service not navigating on Zone R waterways:	
			obtained the Certificate before 30 December 2008 (Article 33.02 of ES-TRIN 2019/1)	the keel of which was laid before 1 January 1985 (Article 33.03 of ES-TRIN 2019/1)
14.05 (1)	P. III, Sec. 10, pp. 10.3.5 and 10.3.11	Access to work stations	NRC; after 30.12.2049	NRC
14.05 (2) and (3)	P. III, Sec. 10, pp. 10.3.15 and 10.4.1	Doors and accesses, exits and passageways where there is more than a 0,50 m difference in floor level	NRC; at the latest — on renewal of the Certificate	
14.05 (4)	P. III, Sec. 10, p. 10.3.15.2	Stairs in work stations which are manned continuously	NRC; after 30.12.2049	
14.06 (2)	P. III, Sec. 10, p. 10.3.1	Exits and emergency exits	NRC; after 30.12.2049	
14.07 (1) (second sentence)	P. III, Sec. 10, p. 10.3.15.2	Ladders, steps and similar devices	NRC; after 30.12.2049	
14.07 (2) and (3)	P. III, Sec. 10, p. 10.3.15.2	Design of ladders	NRC; at the latest — on renewal of the Certificate	
14.10	P. III, Sec. 9, pp. 9.4.5 — 9.4.12	Hatch covers	NRC; after 30.12.2024	
14.11		Winches	NRC; after 30.12.2024	
14.11 (2)		Safety of winches		
14.12 (2) — (6) and (8) — (10)	P. III, Sec. 7, p. 7.1.1	Cranes: manufacturer's plate, maximum permissible loading, protection devices, calculation test, inspection by experts, certificates on board	NRC; after 30.12.2029	
14.13	P. V, Sec. 2, p. 2.4.4	Storing of flammable liquids	NRC; at the latest — on renewal of the Certificate	
15.01 (1)		CHAPTER 15. ACCOMMODATION Accommodation for the persons lodging habitually on board	NRC; after 30.12.2049	NRC
15.02 (3)		Location of floors	NRC; after 30.12.2049	
15.02 (4)	P. III, Sec. 10, p. 10.3.1	Living and sleeping quarters	NRC; after 30.12.2049	
15.02 (5)		Noise and vibration in accommodations	NRC; after 30.12.2029	
15.02 (6)		Headroom in accommodations	NRC; after 30.12.2049	
15.02 (8)		Free floor area of communal living quarters	NRC; after 30.12.2049	
15.02 (9)		Cubic capacity of rooms	NRC; after 30.12.2049	
15.02 (10)		Volume of airspace per person	NRC; after 30.12.2049	
15.02 (11)	P. III, Sec. 10, pp. 10.3.5 and 10.3.15.2	Size of doors	NRC; after 30.12.2049	
15.02 (12)(a) and (12) (b)	P. III, Sec. 10, pp. 10.3.11 and 10.3.15.2	Location of stairs	NRC; after 30.12.2049	
15.02 (13)		Pipes carrying dangerous gases or liquids	NRC; after 30.12.2049	
15.03		Sanitary installations	NRC; after 30.12.2049	
15.04		Galley	NRC; after 30.12.2049	
15.05		Potable water	NRC; at the latest — on renewal of the Certificate	
15.06		Heating and ventilation	NRC; after 30.12.2049	
15.07 (1) (second sentence)		Other accommodations installations	NRC; after 30.12.2049	
18.01 (2) (Tables 1 and 2) and (5)		CHAPTER 18. ON-BOARD SEWAGE TREATMENT PLANTS Limit/control values for the sewage treatment plant parameters and type approvals: .1 transitional provisions shall apply under the following conditions: a) the limit and control values do not exceed the required values by more than the factor 2 according to values of Tables 1 and 2 of Article.18.01 (2) of ES-TRIN 2019/1;	NRC	

Article and paragraph of ES-TRIN 2019/1	Part, Chapter/paragraph of the Rules for INS Construction	Brief content	Deadline for fulfillment of the requirements for ships in service not navigating on Zone R waterways:	
			obtained the Certificate before 30 December 2008 (Article 33.02 of ES-TRIN 2019/1)	the keel of which was laid before 1 January 1985 (Article 33.03 of ES-TRIN 2019/1)
19.01 (5) and (6) 19.08 (10) 19.11 (1)		<p>b) the sewage treatment plant has a manufacturer's or expert's certificate confirming that it can cope with the typical loading patterns on board the ship;</p> <p>c) a system of sludge management is in place for it which is appropriate to the conditions of operating a sewage treatment plant aboard a passenger ship;</p> <p>.2 besides, the sewage treatment plants may continue to be installed and used if they:</p> <p>a) have received an approval on or after 1 December 2011, pursuant to requirements of the Resolution CCNR 2010-II-27 (Step II);</p> <p>b) have received an approval on or after 10 January 2013, pursuant to requirements of the Directive 2012/49/EU (Step II)</p> <p>CHAPTER 19. SPECIAL PROVISIONS APPLICABLE TO PASSENGER SHIPS For ships previously not covered by Directive 82/714/EEC, provisions of Chapter 19 of ES-TRIN 2019/1 shall apply taking into account the deviations made possible by a competent body pursuant to Article 29 of Directive (EU) 2016/1629, as amended, except for the following transitional provisions:</p> <p>vision ahead of the ship and view astern;</p> <p>automated external defibrillator;</p> <p>fire protection materials and components approved according to the International Code for the Application of Fire Test Procedures (FTP Code) (IMO resolution MSC.61(67))</p> <p>CHAPTER 20. SPECIAL PROVISIONS APPLICABLE TO PASSENGER SAILING SHIPS For ships previously not covered by Directive 82/714/EEC, provisions of Chapter 20 of ES-TRIN 2019/1 shall apply taking into account the deviations made possible by a competent body pursuant to Article 29 of Directive (EU) 2016/1629, as amended</p> <p>CHAPTER 21. SPECIAL PROVISIONS APPLICABLE TO CRAFT INTENDED TO FORM PART OF A PUSHED OR TOWED CONVOY OR OF A SIDE-BY-SIDE FORMATION Special winches or equivalent coupling devices Requirements for drive units</p>	<p>deadline is not laid down</p> <p>NRC; after 01.01.2049</p> <p>NRC; at the latest — on renewal of the Certificate NRC</p>	
21.01 (2) 21.01 (3) (last sentence)			<p>NRC; after 30.12.2049</p> <p>NRC; after 30.12.2049</p>	

Article and paragraph of ES-TRIN 2019/1	Part, Chapter/paragraph of the Rules for INS Construction	Brief content	Deadline for fulfillment of the requirements for ships in service not navigating on Zone R waterways:	
			obtained the Certificate before 30 December 2008 (Article 33.02 of ES-TRIN 2019/1)	the keel of which was laid before 1 January 1985 (Article 33.03 of ES-TRIN 2019/1)
29.03 (3)	P. III, Sec. 2, pp. 2.9.9 and 2.9.10	<p>CHAPTER 22. SPECIAL PROVISIONS APPLICABLE TO FLOATING EQUIPMENT For ships previously not covered by Directive 82/714/EEC, provisions of Chapter 20 of ES-TRIN 2019/1 shall apply taking into account the deviations made possible by a competent body pursuant to Article 29 of Directive (EU) 2016/1629, as amended</p> <p>CHAPTER 26. SPECIAL PROVISIONS APPLICABLE TO RECREATIONAL CRAFT For ships previously not covered by Directive 82/714/EEC, provisions of Chapter 20 of ES-TRIN 2019/1 shall apply taking into account the deviations made possible by a competent body pursuant to Article 29 of Directive (EU) 2016/1629, as amended</p> <p>CHAPTER 29. SPECIAL PROVISIONS APPLICABLE TO HIGH-SPEED CRAFT Second independent steering apparatus drive unit</p>	NRC; after 01.01.2029	

INSTRUCTIONS FOR DETERMINATION OF THE TECHNICAL CONDITION AND REPAIR OF THE HULLS OF INLAND NAVIGATION SHIPS

1 PURPOSE

1.1 APPLICATION

1.1.1 The Instructions for Determination of the Technical Condition and Repair of the Hulls of Inland Navigation Ships¹ contain regulations for determining technical condition and recommendations for repairing the hulls of displacement ships in service that are subject to the technical supervision of the Register. The provisions of the Instructions apply to the hulls, superstructures and deckhouses of steel ships and, unless expressly provided otherwise, to superstructures and deckhouses made of aluminum alloys.

The Instructions apply to ships, which purpose, dimensions and design are covered by the Rules for INS Construction (refer to 1.1.2).

1.1.2 The Instructions supplement the Rules for INS Construction and the Rules for INS Surveys.

1.1.3 The provisions of the Instructions are based on the condition of ensuring safe hull operation between special surveys assigned for renew of class in accordance with 4.1, Part I "General" of the Rules for INS Surveys.

1.1.4 The provisions of the Instructions cover the following hull structural defects:

wear;

residual deformations;

cracks and ruptures.

1.1.4.1 The Instructions contain the definitions of the following types of wear:

total wear;

local wear, namely spot wear, linear wear, groove wear;

pitting.

1.1.4.2 The Instructions contain the definitions of the following types of residual deformations:

deflections;

ribs;

indentations;

bulges.

1.1.5 In some cases, when substantiations approved by the Register are available, the deviations from the provisions of the Instructions are permissible.

¹Hereinafter referred to as "the Instructions".

1.2 DEFINITIONS

1.2.1 For the purpose of the Instructions, the following definitions have been adopted.

Framing member is a member of primary or deep framing.

Deflection is a residual deformation of plating portion between adjacent non-deformed framing (girders) (refer to Fig. 1.2.1-1).

Indentation (set-in, set-down, set-up, set-back) is a residual deformation of plating portion together with framing (girders) (refer to Fig. 1.2.1-1).

Indentation (set-in, set-down, set-up, set-back) is a residual deformation of plating portion together with framing (girders) (refer to Fig. 1.2.1-1).

Rib is a residual deformation of two and more adjacent plating portions between framing (girders) (refer to Fig. 1.2.1-1).

Group of structural members is a set of hull members designed to perform the same functions and used under equal conditions as other group members (e.g., deck plates, bottom plates with bilge, side shell plating, longitudinal bulkheads, deck longitudinals of the same profile, etc.), framing members may be grouped irrespective of plate elements or included into the relevant group together with plate members.

Defect is a member thickness variation (wear), an initial shape deformation (residual deformation), loss of integrity (crack, fracture and rupture) of the hull structure due to wear, damage or procedural violations during shipbuilding and ship repair works relating to the hull.

Flaw detection is a process of identifying and quantitative evaluation (sizing) of defects in the hull or hull members, which shall be determined instrumentally and the defect parameters shall be recorded.

Residual deformation is a change in the initial form of the hull or hull member that remains after removal of loads causing the deformation.

Wear is a diminution of hull member thickness due to corrosion, erosion and/or abrasion.

Groove wear is a groove-shaped reduction of plate or hull member thickness (refer to Fig. 1.2.1-2).

Linear wear is a plate thickness reduction on the narrow length of welds, by which hull members are attached (refer to Fig. 1.2.1-2).

Local wear is a local reduction in the thickness of hull members (plate sections) in the form of groove, linear and spot wear.

Total wear is an approximately equal diminution of hull member thickness over their entire surface, determined by a sum of measurements at various points of the hull member, except for sections with pitting (refer to Fig. 1.2.1-2).

Spot wear is a local thickness diminution of part of the plate (refer to Fig. 1.2.1-2) or portion of framing (girder) web as separate spots.

Pitting is a local hull member thickness reduction in the form of separate recesses, rustings, pits, cavities, etc. (refer to Fig. 1.2.1-2). Pitting intensity is defined as shown in Fig. 1.2.1-3.

Plate is a plating element limited by the welds.

Uniform plates are the plates of plating related to one of the following groups:

deck plating between the side and the line of large openings;

inner bottom plating;

bottom plating including the bilge;

side shell plating;

inner side (inner skin) plating;

plating of longitudinal bulkheads;

continuous side coamings amidships, etc.

Ship's ends are sections of the ship's length $0,15L$ from the fore and aft perpendiculars.

Transitional regions are sections of the ship's length between the midship and the ship's ends.

Damage is a defect, which parameters are not in agreement with standards.

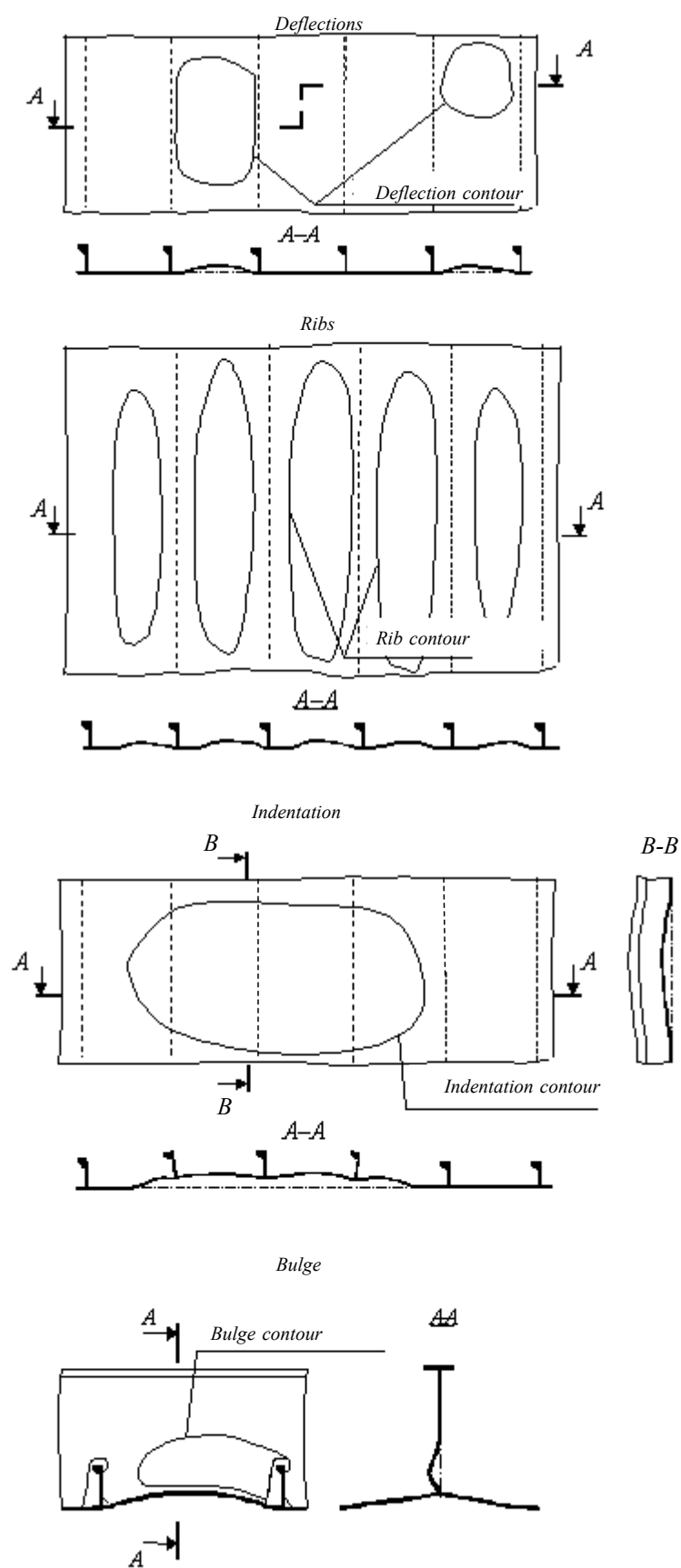


Fig. 1.2.1-1 Types of residual deformations

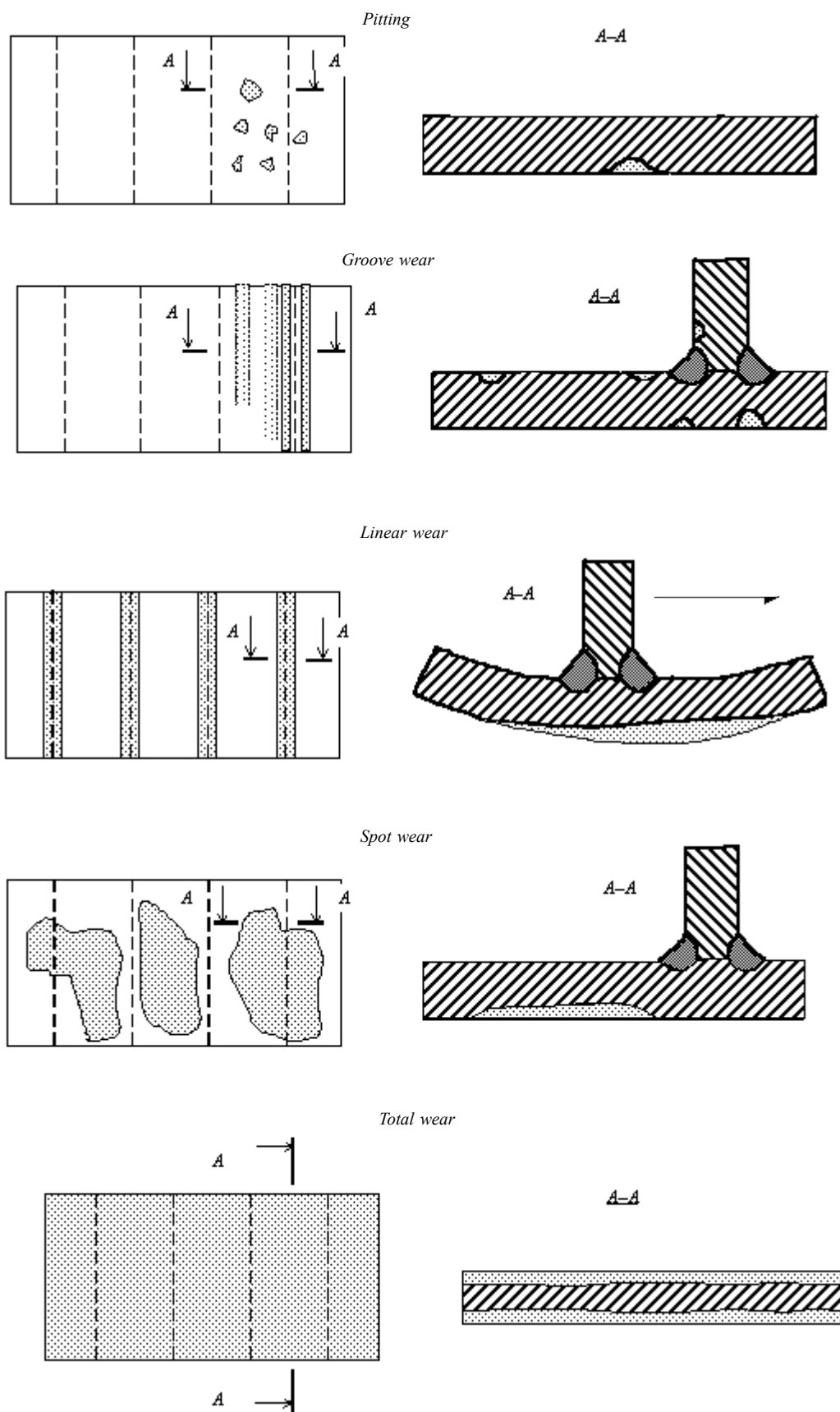


Fig. 1.2.1-2 Types of wear

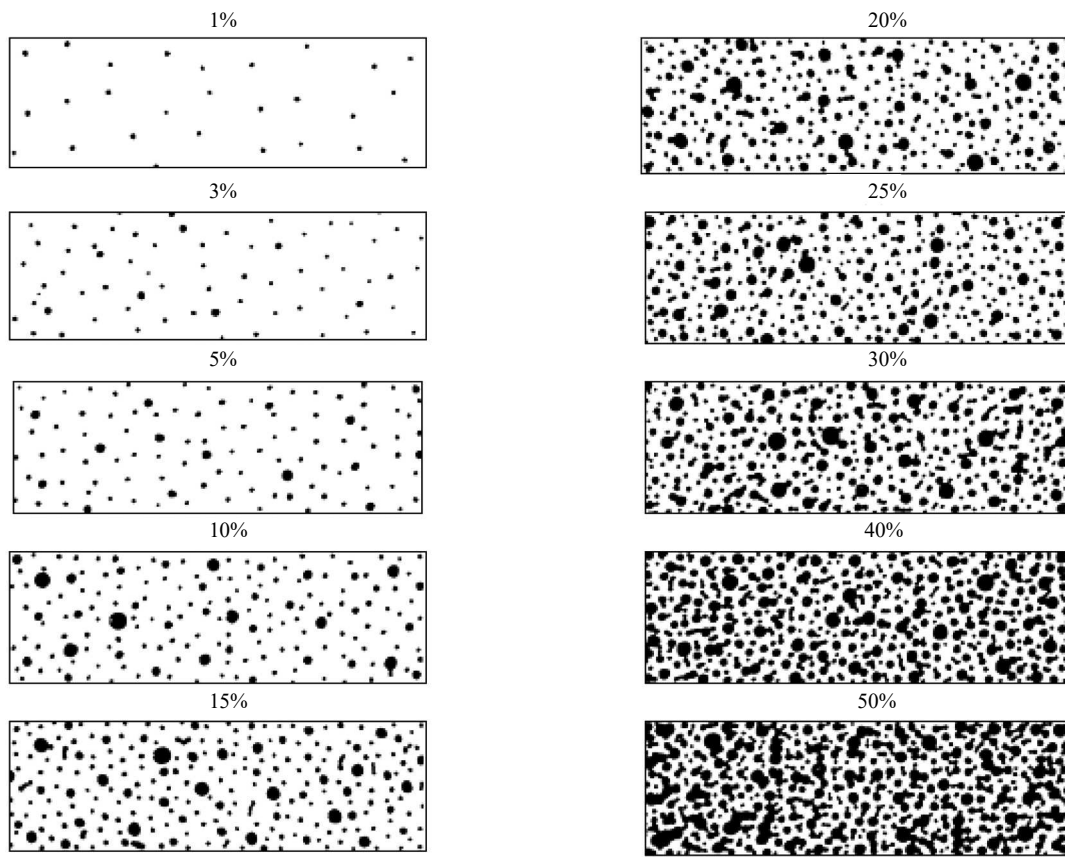


Fig. 1.2.1-3 Pitting intensity (area) of the plate (from 1 % to 50 %)

Local strengthening is a stiffener, knee or bracket ensuring the strength, rigidity and stability of a plate section or web frame/girder web, as well as a stanchion of double bottom, double side, tank, etc.

Ultimate bending moment is a bending moment, the value of which is equivalent to the material yield stress value in one of the hull members, most distant from the neutral axis.

Rupture is a fracture type discontinuity of a hull member as a result of external actions and due to depletion of the material plasticity.

Strengthening area is a hull area, for which additional strengthening of structures is stipulated by the Rules for INS Construction, e.g. ice strengthening.

Midship region is the part of the ship's length equal to $0,5L$ ($0,25L$ forward and aft of amidships), unless expressly provided otherwise.

Measuring device is a facility for measuring the parameters of defects, which has standardized metrological properties.

Higher strength steel is the steel with yield strength exceeding 235 MPa.

Camber (deflection) is the distance between the point on the surface of the deformed member and the same point on the surface of the same figuratively non-deformed member.

Hull technical condition is the complex of parameters, on which the strength, rigidity and integrity of the hull depend and which vary because of defects originating and developing during the ship service.

Average (mean) residual thickness is a thickness defined as a mean thickness from a series of measurements of the actual residual thickness of the member.

As-built thickness is a thickness stated in the hull report (as-built) drawings.

Required thickness is a thickness required by the Rules for INS Construction.

C r a c k is a fracture type discontinuity of a hull member caused by material fatigue or brittle fracture.

S p a c i n g is a distance between primary members (for transverse framing system — between ordinary frames and for longitudinal framing system — between longitudinals).

H u l l m e m b e r is a plate, framing (girder), web and face plate of framing (girder), weld, riveted connection, connecting element, local strengthening (reinforcement).

C o n n e c t i n g e l e m e n t is a knee, bracket, liming, plate, etc., which ensure the connection of hull members.

P l a t e s e c t i o n is a portion of the plate surface limited by adjacent framing (girders) or hull structures walls.

1.2.2 Symbols used for hull member thickness, in mm:

S_0 — as-built thickness;

S_1 — average residual thickness in case of total wear;

S_2 — average residual thickness of member group at transverse section in question;

S_3 — residual thickness in case of local wear;

S_4 — residual thickness in a pit.

1.2.3 Definitions not included in this Chapter shall be found in the Rules for INS Construction and in the Rules for INS Surveys.

2 INSTRUCTIONS FOR DETERMINATION OF THE HULL TECHNICAL CONDITION

2.1 GENERAL

2.1.1 This Section provides guidance for assessing the technical condition of the hull and its members based on the defects found during the ship survey.

2.1.2 Assessment of the hull technical condition shall be carried out based on the results of comparison between actual parameters of the defects found and their permissible values. Actual parameters of defects shall be determined in compliance with the requirements of Section 3 of these Instructions and, where applicable, taking into account provisions of Annex 2 to the Rules for the Classification Surveys of Ships in Service. Technical conditions of the hull are established as follows:

.1 "complying with the RS requirements" (hereinafter referred to as "complying") denotes the ship hull, the numeric parameters of which members are, in complex, in compliance with the standards applicable to the ship current class;

.2 "not complying with the RS requirements" (hereinafter referred to as "not complying") denotes the ship hull, the numeric parameters of which members are not in compliance with the standards established for its current class.

Hull members that are not in compliance with standards shall be repaired. When carrying out the repair, the provisions of Section 5 shall be met.

2.1.3 Assessment of the hull technical condition is carried out periodically within periods and in the scope set down by the Rules for INS Surveys.

2.1.4 For assessment of the hull technical condition, the following elements shall be verified for compliance with the conditions of 2.2 — 2.4.

- member groups (only for ships of 25 m in length and above);
- plates;
- girders;
- welded and riveted joints.

2.1.5 The results of the ship's hull technical condition assessment shall be drawn up by the shipowner or authorized shipowner's representative in the form of report(s) on gauging of the hull wear and defect parameters drawn up in accordance with Section 6 of these Instructions (total, local wear and pitting of hull structures and other hull members, wear of welds and riveted joints, connecting elements and local strengthening, residual deformations, hull cracks, etc.).

2.1.6 Conclusion on the hull technical condition shall be recorded by the RS surveyor performing the ship survey in the reports and checklists drawn up in accordance with 7.5, Part I "General Provisions" of the Rules for INS Surveys.

Based on the results of gauging of wear and defect parameters, completion of repairs to the extent required shall be confirmed in the RS reports issued upon the survey results. The RS surveyor shall list in the reports all the hull structures repaired with their designation and location, repair method (complete or partial replacement, strengthening, etc.), including the steel grade and dimensions of the replaced hull members, relevant sketches/photos, repair extent, results of non-destructive testing (NDT) and tests performed.

Information on available doublers, doubling straps, where fitted, as well as on defects (residual deformations of hull members) not exceeding the permissible limits shall be recorded in the RS reporting documents with indication of their location and dimensions, and shall be taken into account during assessment of the ship's hull technical condition at subsequent surveys.

2.1.7 When ship's hull structures failures resulting from causes other than collision, grounding, improper or inadequate operation, improper loading, human error or action, natural disaster, etc. are found, the appropriate information on damages shall be recorded by the RS surveyor and forwarded to RHO in accordance with the RS internal procedures.

2.1.8 The set of records on the hull technical condition, as required by the Instructions and the Rules for INS Surveys, shall be kept on board by the shipowner and at the RS Branch Office where the ship is registered.

2.2 STRUCTURES WITH WEAR

2.2.1 Groups of structural members (member groups) (for ships of 25 m in length and above).

In case of total wear, member groups shall meet the condition

$$S_2 \geq [S_2] \quad (2.2.1)$$

where $[S_2]$ = permissible residual member group thickness in accordance with Table 4.2.1.1.

Longitudinal strength of the ship is considered to be ensured if the actual member group thicknesses are not lower than those given in Table 4.2.1.1.

Deviations from average residual member group thickness norms and local residual deformation parameters given in Tables 4.2.1.1 and 4.3.1 may be permitted, if the ship's hull girder longitudinal (overall) strength calculations with evaluation of the ultimate bending moment M_{ult} performed according to the procedure agreed with the Register, confirm the actual strength characteristics compliance with the ship's service conditions.

In any case, cracks in hull members contributing to longitudinal (overall) strength shall not be permitted.

2.2.2 Plates

2.2.2.1 In case of total wear, a plate shall meet the condition

$$S_1 \geq [S_1] \quad (2.2.2.1)$$

where $[S_1]$ = permissible residual plate thickness in accordance with 4.2.2.1.

2.2.2.2 In case of local wear, a plate area shall meet the condition

$$S_3 \geq [S_3] \quad (2.2.2.2)$$

where $[S_3]$ = permissible residual plate area thickness in accordance with 4.2.2.2.

2.2.2.3 In case of pitting, a plate shall meet the condition

$$S_4 \geq [S_4] \quad (2.2.2.3)$$

where $[S_4]$ = permissible residual plate thickness in the pit in accordance with 4.2.2.3.

2.2.3 Girders.

2.2.3.1 In case of total wear, a girder cross section shall meet the conditions:

$$W_1 \geq [W_1]; \quad (2.2.3.1-1)$$

$$F_1 \geq [F_1] \quad (2.2.3.1-2)$$

where F_1, W_1 = residual cross-section modulus with effective flange and residual web girder cross-sectional area in accordance with 3.2.4.1;

$[F_1], [W_1]$ = permissible residual cross-section modulus and residual web girder cross-sectional area in accordance with 4.2.3.1 — 4.2.3.2.

Only those characteristics of hull girder cross-section shall be verified according to Formulae (2.2.3.1-1) and (2.2.3.1-2), that are covered by the requirements of the Rules for INS Construction.

Check according to Formulae (2.2.3.1-1) and (2.2.3.1-2) is not required, however these conditions shall be taken into account at determination of the permissible residual thickness $[S_1]$. The following calculation procedure is recommended:

permissible residual girder web thickness shall be determined from Formula (2.2.3.1-2);

having calculated the permissible residual girder web thickness, using its actual height as well as the permissible residual thickness of effective flange, the permissible residual thickness of the girder face plate shall be determined from Formula (2.2.3.1-1).

2.2.3.2 In case of local wear, a girder member area shall meet the condition

$$S_3 \geq [S_3]. \quad (2.2.3.2)$$

2.2.3.3 In case of pitting, a girder member shall meet the condition

$S_4 \geq [S_4]$. (2.2.3.3)

This provision applies only to those girders, which ensure structural integrity, for instance, the integrity of floors, stringers, beams, which are the upper supports of corrugated transverse tight bulkheads, etc.

2.2.4 Welded and riveted joints.

2.2.4.1 When worn on lengths exceeding 0,3 m, welds, which condition shall be assessed on the basis of 3.2.5, shall comply with the provisions of 4.2.4.1.

2.2.4.2 Worn riveted joints, which condition shall be assessed on the basis of 3.2.5.4, shall comply with the provisions of 4.2.4.2. The joints shall be tight in structures, where it is necessary.

2.3 STRUCTURES WITH DEFORMATIONS

2.3.1 Hull cross-sectional characteristics.

2.3.1.1 Deformations of the continuous side coaming are not permitted amidships for ships of 50 m in length and above.

2.3.2 Deflections and ribs.

2.3.2.1 Structures containing deflections or ribs with the maximum camber of 25 mm and less, or 1/20 of spacing, whichever is less, need no further measurement, assessment or repair.

2.3.2.2 When examination from both sides revealed no cracks or ruptures, the structures containing deflections, except for deck stringer, sheer strake and bottom shell plating amidships, may not be measured or repaired.

2.3.2.3 When examined from one side, structures containing deflections, as well as the strength deck plates outside the line of hatch openings, sheer strake and bottom shell plating containing deflections amidships shall meet the condition

$$f'/b' \leq [f/b] \quad (2.3.2.3)$$

where f' = maximum deflection camber in accordance with 3.3.3.1;
 b' = minimum size of deflection in profile in accordance with 3.3.3.2;
 $[f/b]$ = permissible relative camber in accordance with 4.3.1.

2.3.2.4 Ribbed structures shall meet the condition

$$f'/a' \leq [f/a] \quad (2.3.2.4)$$

where f' = maximum rib camber in accordance with 3.3.3.3;
 a' = girder spacing in accordance with 3.3.3.4;
 $[f/a]$ = permissible relative camber in accordance with 4.3.1.

2.3.3 Indentations and bulges.

2.3.3.1 Indentations with the maximum girder camber of 25 mm and less regardless of the extent across the ship's breadth, need not further measurement, assessment or repair.

2.3.3.2 In the bottom and strength deck amidships, as well as in the sheer strake, single fair indentations are permissible, which maximum size in profile would not exceed five spacing and for which the maximum residual girder camber to the minimum size ratio would not exceed 1/20.

2.3.3.3 In the absence of a bulge, the girders shall simultaneously meet the following conditions:

$$f'/l' \leq [f/l];$$

$$d'/h \leq [d/h]; \quad (2.3.3.3-1)$$

$$f'/c' \leq [f/c]$$

where f' = maximum girder camber in accordance with 3.3.4.2;
 l' = length of deformed girder area in accordance with 3.3.4.2;
 d' = girder web deviation from the initial position in accordance with 3.3.4.3;
 h = girder depth in accordance with 3.3.4.4;
 $[f/l]$ = permissible relative girder camber in accordance with 4.3.1;
 $[d/h]$ = permissible relative girder web deviation in accordance with 4.3.1;
 c' = distance between the girder camber with maximum section and its nearest non-deformed support in accordance with 3.3.4.5;
 $[f/c]$ = permissible relative position of girder camber maximum in accordance with 4.3.1.

Primary members, which do not comply with the first of conditions of Formula (2.3.3.3-1), and which relative camber lies within

$$[f/l] < f'/l' < 1,5[f/l], \quad (2.3.3.3-2)$$

shall comply with the condition

$$f_{300} \leq [f_{300}] \quad (2.3.3.3-3)$$

where f_{300} = 300 mm-based girder camber in accordance with 3.3.4.6;
 $[f_{300}]$ = permissible 300 mm-based girder camber in accordance with 4.3.1.

2.3.3.4 Where a bulge is present, girders and plate elements shall comply with the first of conditions of Formula (2.3.3.3-1) where:

f' and l' = maximum camber and deformed area length of a girder or plate elements in accordance with 3.3.4.7;

$[f/l]$ = permissible relative camber of a girder web area or plate element in accordance with 4.3.1.

2.3.4 Welded, riveted joints, connecting elements and local strengthening.

2.3.4.1 In structures with residual deformations, the welds and riveted joints shall comply with the applicable provisions of these Instructions. Where necessary, the riveted joints of structures shall be tight.

2.3.4.2 In connecting elements (knees) and in local strengthening, the residual deformations shall be determined based on technical supervision experience.

2.4 STRUCTURES WITH CRACKS AND RUPTURES

2.4.1 No cracks or ruptures are permitted in the hull members.

2.4.2 Any cracks, fractures or ruptures shall be eliminated (repaired). Instructions on repair cracks, fractures or ruptures are given in 5.4.

3 PROCEDURE OF INSPECTION (FLAW DETECTION) OF THE SHIP'S HULL

3.1 GENERAL

3.1.1 This Section describes the hull flaw detection for the purpose of assessment of the hull technical condition in accordance with the provisions of Section 2.

3.1.2 The provisions of this Section set down the procedure for measuring the parameters of hull members with the defects found during examinations or surveys.

3.1.3 The dates and scope of the hull flaw detection are established by the Rules for INS Surveys.

The dates and scope of the hull flaw detection may be specified by the Register based on the ship technical condition.

3.1.4 The hull shall be prepared for flaw detection by the shipowner: insulation and lining shall be opened and removed; corrosion products, sludge deposits, residual fluids and etc. shall be removed from surfaces to be measured; scaffolding and other means of access to structures to be measured shall be prepared, tanks shall be degassed, etc.

3.1.5 Parameters of deformations, cracks and other defects (except thickness measurements) shall be measured either by the RS at the shipowner's written request, or by the shipowner in the presence of the RS surveyor.

Thickness measurements of hull members, piping, arrangements and other ship structures shall be carried out either by the RS at the shipowner's written request, or by the firms recognized by the Register for this kind of activity (hereinafter referred to as "the TM service supplier"), in the presence of the RS surveyor to the extent necessary for the process control (this requirement also applies to thickness measurements taken during voyages). The attendance of the RS surveyor shall be recorded in the RS reporting documents drawn up upon the survey results in accordance with 7.5, Part I "General Provisions" of the Rules for INS Surveys.

3.1.6 Instructions on planning, carrying out and monitoring of thickness measurements onboard, on results review and verification as well as on use, storage and calibration of instruments are given in Section 3 of Annex 2 to the Rules for the Classification Surveys of Ships in Service.

3.2 STRUCTURES WITH WEAR

3.2.1 Examination of structures.

3.2.1.1 Condition of hull structures with wear shall be characterized by residual thicknesses to be determined by measurements.

3.2.1.2 Hull flaw detection schemes with assigned transverse sections (for ships more than 25 m in length), locations for residual thicknesses measurements of hull members shall be developed taking into account the following:

transverse sections chosen for determining the members residual thickness as regards the hull strength shall be the most structurally weakened and the most worn sections (with large openings, with minimum sectional areas, etc.);

technical requirements for the scheme shall specify the necessity of residual thickness measurements in additional locations if visual examination and previous flaw detections reveal areas with higher wear compared with those in the scheme; the residual thickness measurements shall normally be performed on sections having no replaced plates;

residual thicknesses of each member group (at transverse section) shall be determined, where practicable, for every group member.

3.2.1.3 The type of wear of a hull member shall be determined visually during the ship survey based on the experience in technical supervision and random measurements of residual thickness.

3.2.1.4 Residual thickness of hull members shall normally be determined using non-destructive testing (NDT) methods. Measurements may be taken with a thickness meter, caliper, micrometer and other approved measuring devices.

The precision of hull member thickness measurements shall not be less than 0,1 mm.

The depth of pits is measured using depth meter, indicating gage or other similar instruments to ensure the precision not less than 0,1 mm.

3.2.1.5 Worn hull members shall be examined with due regard to the service conditions for the structures and based on the experience in technical supervision.

3.2.2 Groups of structural members (member groups).

3.2.2.1 Average residual member group thickness S_2 shall be determined from the formula

$$S_2 = \frac{\sum_{i=1}^n (S_1^i b_m^i)}{\sum_{i=1}^n b_m^i} \quad (3.2.2.1)$$

where S_1^i = average residual thickness of the i -th structural member, in mm;
 b_m^i = breadth of the i -th structural member, in m;
 n = number of structural members in the group.

3.2.2.2 For assessment of the hull technical condition by S_2 criterion or calculation of the ship's hull girder longitudinal (overall) strength (refer to 2.2.1), the most structurally weakened and the most worn sections (considering the repairs made) shall be taken.

Calculations shall be made for average residual member group thicknesses within the chosen transverse section limited by the length of a plate arranged longitudinally.

3.2.2.3 In case where the ship's hull girder longitudinal (overall) strength calculation is required, the ultimate bending moment M_{ult} , in kHm, shall be determined from the formula (separately for hogging and sagging)

$$M_{ult} = \pm 10^{-3} \sigma_n W_{Deck(Bottom)} \quad (3.2.2.3)$$

where σ_n = standard yield stress, in MPa;
 $W_{Deck(Bottom)}$ = residual hull section modulus calculated considering the reduction of compressed hull members, in cm³.

Doublers used for temporary repair in accordance with 5.2.3.1 shall not be considered while calculating section modulus.

3.2.3 Plates.

3.2.3.1 In case of total wear, the average residual plate thickness S_1 , in mm, is determined as an arithmetic mean of residual thicknesses measured at points uniformly distributed over the plate surface.

Measurements shall be taken in forward, middle and after parts of the plate, at least in 3 points per plate or at 1 point per 5 m² of the plate surface, whichever is greater.

3.2.3.2 In case of local wear, the average residual thickness of a plate area S_3 , in mm, is determined on the basis of measurements at points lying within the worn plate area, as follows:

as an arithmetic mean of values measured at points with residual thicknesses for the case of spot wear and linear wear of plate areas;

from the following formula for the case of groove wear

$$S_3 = S_1 - (h_1 + h_2) \quad (3.2.3.2)$$

where h_1 and h_2 = groove depth, in mm, on the face and the reverse side of the plate respectively.

Measurement points shall be uniformly distributed on the worn plate area. The number of points for residual thickness measurements shall be not less than:

three arranged uniformly within a plate section, for the case of spot wear;

three within a zone not nearer 10 mm to and not farther than 20 mm from the stiffening girder in the direction of the greatest wear, for the case of linear wear (where the transverse framing system is applied, the most worn side would normally be the one lying forward of the stiffening girder);

one per 0,3 m of groove length, for the case of groove wear.

3.2.3.3 In case of pitting, the residual plate thickness S_4 , in mm, is determined based on the wear measured in the pits within the plate section, as given by the formula

$$S_4 = S_1 - h_4 \quad (3.2.3.3)$$

where h_4 = maximum measured pit wear, in mm, with regard to the plate area surface.

The number of pits to be measured is in each case determined based on their visual examination. If the pits are difficult to separate, the maximum pit wear shall be determined with regard to a bar 300 to 400 mm long, which is freely, placed on the plate surface, cleaned from corrosion products.

3.2.4 Girders.

3.2.4.1 In case of total wear, the residual section modulus W_1 , in cm³, of a girder with a flange determined on the basis of the Rules for INS Construction, the cross-sectional area F_1 in cm², of a girder web and the average residual thickness S_1 , in mm, of a girder member are determined based on the residual thickness measurements taken on one section of the most worn girder at points on their webs and flanges.

Residual girder member thicknesses are measured on the most worn sections at supports and the midspan.

The number of points for measuring the residual thicknesses of girder webs and effective flange shall be at least two along the effective flange breadth and two along the web depth for a built-up girder; the measured values shall be rounded off separately for effective flange and web;

for a girder made of rolled angle sections, one on the effective flange and one on the web;

for a girder made of rolled bulb sections, one on the web.

The residual thicknesses of girder members shall be measured at the following points:

on the web, if measured at toe in way of the weld, by which the girder is connected with the plate being strengthened, and, where necessary, at 2/3 of web depth from the toe;

on the effective flange, if measured at edge(s).

3.2.4.2 In case of local wear, the average residual thickness S_3 , in mm, of a girder member area is determined on the basis of residual thickness measurements to be taken on its most worn section at points on its web or flange.

The length of worn area and the weakest section of the girder on its span are determined either visually or by random measurements of residual thicknesses of its members.

The average residual thickness of a girder member area, as well as the number and arrangement of residual thickness measurement points on the effective flange or web of a girder shall be determined in accordance with 3.2.3.2.

3.2.4.3 In case of pitting, the residual thickness S_4 , in mm, of a girder member and the number of measurement points shall be determined in accordance with 3.2.3.3.

3.2.5 Welded and riveted joints.

3.2.5.1 On a length of more than 0,3 m, the degree and uniformity of butt weld wear is determined by comparing the welds with the surface of the plates being joined, and the fillet weld wear is determined by measuring the weld leg.

The number of points for measuring the weld wear is determined based on the experience in technical supervision.

3.2.5.2 If a weld is worn on a length between 0,1 m and 0,3 m, its average residual thickness S_3 , in mm, shall be determined as a difference between the residual plate thickness in way of the worn weld and the groove depth.

3.2.5.3 If a weld is worn on a length not exceeding 0,1 m its residual thickness S_4 , in mm, is determined in accordance with 3.2.3.3 as in the case of a pitted hull element.

3.2.5.4 The wear of riveted joints is determined based on examination, tapping, random measurement of rivets and plate edges, testing the integrity of structures, for which it is required.

3.3 STRUCTURES WITH DEFORMATIONS

3.3.1 Examination of structures.

3.3.1.1 The condition of hull structures with deformations is characterized by maximum residual camber and the dimensions of deformed areas of structures in projection.

3.3.1.2 The type of hull member deformation shall be determined visually during the ship survey based on the experience in technical supervision. In some cases, additional measurements of residual camber in stiffeners may be required to determine the deformation type.

3.3.1.3 The deformation parameters shall be measured with regard to the initial non-deformed surface using standard measuring devices, such as a ruler, a caliper with a depth meter, an indicating gage, etc.

When deformed structural areas are measured in projection, the precision shall be 100 mm at least, for maximum camber, this shall not be less than 1 mm, and for 300 mm-based camber, not less than 0,1 mm.

3.3.1.4 Deformed hull members shall be examined with due regard to the service conditions for the structures and based on the experience in technical supervision.

3.3.2 Assessment of local residual deformations.

3.3.2.1 Indentations shall be assessed against three parameters:

indentations extent across the ship's breadth, separately for deck and bottom $\Sigma b_i/B$ ($\Sigma d_i/B$) or over the ship's depth $\Sigma h_i/D$, separately for each side (Fig. 3.3.2.1), and the ship's depth parameter shall apply only to ships made of aluminum alloys;

maximum camber f' for girder in an indentation;

ratio of the maximum camber f' for girder in an indentation to the minimum size in profile l' , and for the ratio f'/l' only ultimate value shall be specified exceeding which the technical condition of the ship shall be recognized as non-compliant with the requirements of the Rules for INS Surveys.

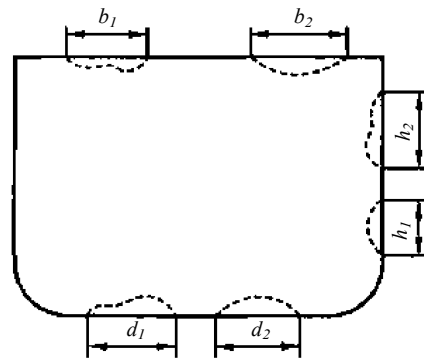


Fig.3.3.2.1 Indentations

3.3.2.2 The camber shall be measured in the cross-section of the deformed framing (girder) in way of the maximum sagging.

The ratio f'/l' defines the indentation fairness.

3.3.2.3 Parameters for ribs and deflection assessment are identical for transverse or longitudinal framing systems.

3.3.2.4 Measurements of local residual deformations (rib, deflection, indentation) (Figs. 3.3.2.4-1 — 3.3.2.4-3) shall be taken with a ruler, a template, a meter ruler. The cambers shall be measured with an accuracy not exceeding 2 mm, and the deformed sections of structures in profile — with an accuracy not exceeding 100 mm.

3.3.3 Deflections and ribs.

3.3.3.1 The maximum camber f' , in mm, of a deflection or a rib shall be measured with regard to girders. The pattern of measuring f' is shown in Fig. 3.3.3.1.

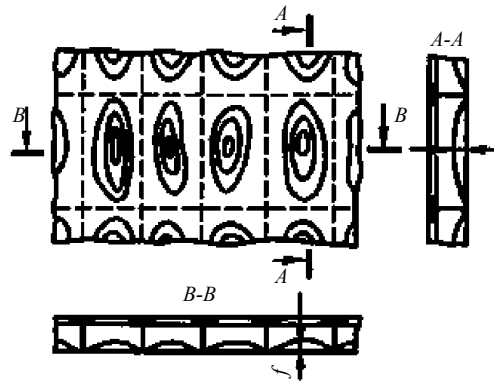


Fig. 3.3.2.4-1 Rib

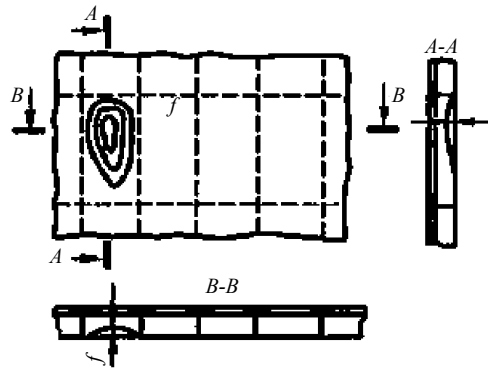


Fig. 3.3.2.4-2 Deflection

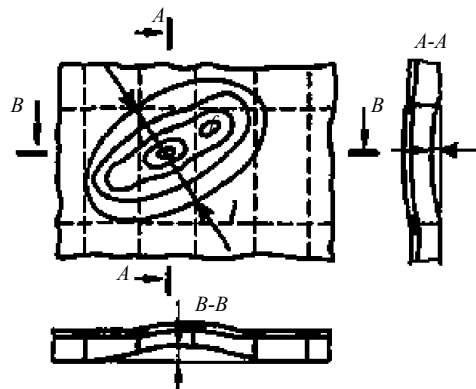


Fig. 3.3.2.4-3 Indentation

3.3.3.2 The minimum size of deflection in profile b' , in mm, is measured in the area of the maximum hogging. The pattern of measuring b' is shown in Fig. 3.3.3.1.

3.3.3.3 The maximum rib camber f' , in mm, is determined as the maximum value measured for each rib.

3.3.3.4 The spacing a , in mm, of primary members is either determined by the structural plan or is measured on the structure.

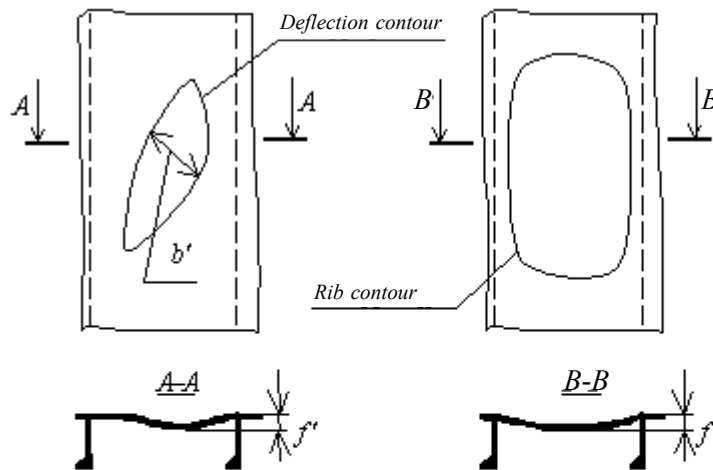


Fig. 3.3.3.1 Measurement of deflection and rib parameters

3.3.4 Indentations.

3.3.4.1 In case of the structure with an indentation where 10 successive primary members are deformed, measurements shall be taken on each girder, where 10 to 15 girders are deformed, every other girder may be measured, and where 15 or more girders are deformed every third girder may be measured including the one having the maximum camber f' .

3.3.4.2 The maximum camber f' , in mm, and length l' , in mm, of the deformed girder section shall be measured in the same plane, in which the girder lies. The patterns of measuring f' and l' are shown in Fig. 3.3.4.2, *a*.

3.3.4.3 The deviation d' , in mm, of a girder web from its initial position is measured on the faceplate level where the deviation is the greatest. The pattern of measuring d' is shown in Fig. 3.3.4.2, *a*.

3.3.4.4 The girder depth h , in mm, is determined from the structural plan or is measured on the structure.

3.3.4.5 The distance between the girder section c' , in mm, at which the camber is the greatest and its nearest non-deformed support shall be measured in the same plane, in which the girder lies. When measuring the value of c' web frames/girders fitted perpendicularly, as well as decks, platforms, bulkheads, etc. serve as supports for a primary member. The pattern of measuring c' is shown in Fig. 3.3.4.2.

Note. The value of c' shall not be measured in the following cases:
 girder is deformed together with the support;
 indented area of structure does not reach as far as the support;
 less than 5 successive girders are deformed in way of indentations.

3.3.4.6 The 300 mm-based camber f'_{300} , in mm, of a girder is measured in way of the maximum camber f' . The pattern for measuring is shown in Fig. 3.3.4.2, *a*.

3.3.4.7 The maximum camber f' , in mm, and the deformed area length l' , in mm, of a girder or plate elements are measured in the same plane, in which they lie. The patterns of measuring f' and l' are shown in Fig. 3.3.4.2, *b*.

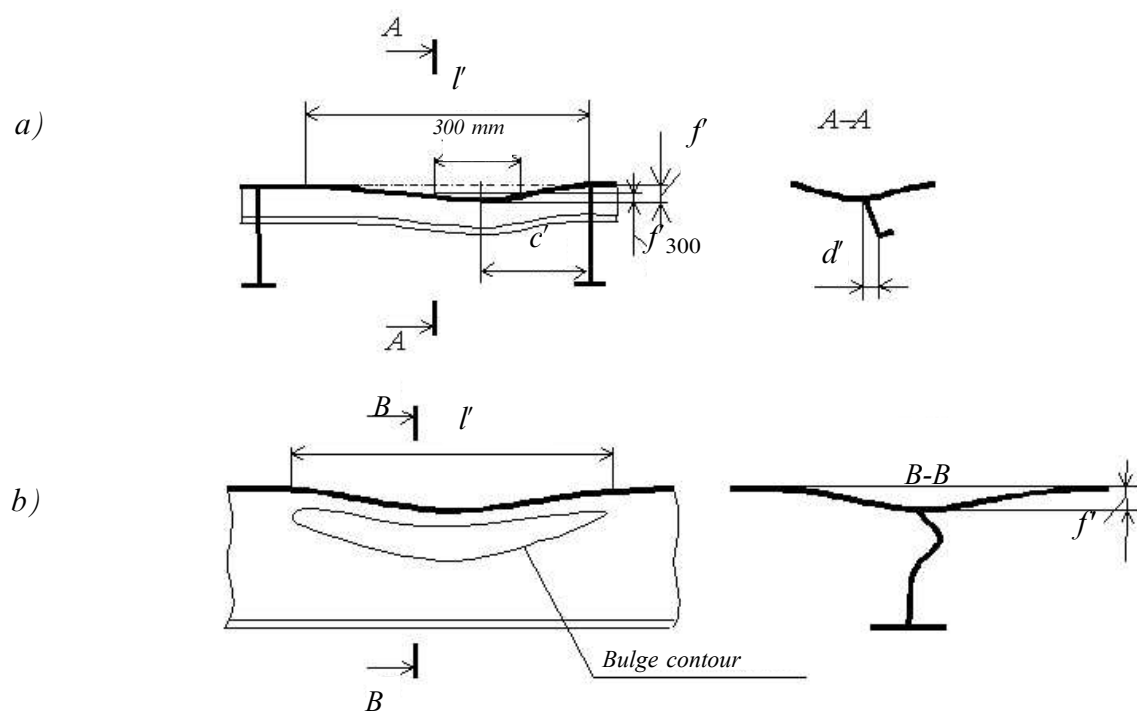


Fig. 3.3.4.2 Measurement of indentation parameters:
a) for main framing girders; b) for web framing girders and plate elements

3.4 STRUCTURES WITH CRACKS AND RUPTURES

3.4.1 Examination of structures.

3.4.1.1 Condition of the hull structures with cracks and ruptures is characterized by their type, location within the structure, length, area, orientation and opening displacement, which are determined by measurements.

3.4.1.2 The type of crack or rupture is determined visually during the hull survey and based on the experience in technical supervision.

3.4.1.3 The cracks and ruptures in hull members may be revealed as a result of examination, tests and by using the following testing methods:

- radiographic testing;
- ultrasonic testing;
- magnetic particle testing;
- dye penetrant testing;
- using aqueous dispersions;
- using kerosene with chalk, etc.

3.4.1.4 The crack or rupture parameters are measured on the surface of the damaged hull member by means of a caliper, ruler or other measuring devices, which ensures a precision of not less than 5 mm.

3.4.1.5 The values measured on cracks shall be drawn up as the tables, as well as drawings and sketches showing the cracked structure with indication of the length, opening displacement and orientation of the crack.

The values measured on ruptures may be represented in an arbitrary form.

It is recommended that the tables should be submitted to the Register in electronic form.

3.4.1.6 The examination of hull members with cracks and ruptures shall be carried out with due regard to the service conditions of the structures and based on the experience in technical supervision.

3.4.2 Measurement of crack parameters.

The crack length λ' , in mm, in a hull member is measured on the shortest distance between its ends. The location of the crack end shall be determined visually with an addition of 10 mm.

The opening displacement t' , in mm, of a crack is determined by the maximum distance between its edges. The crack orientation in a member is determined by the angle α , in deg., formed by the line connecting the beginning and end of the crack, and the centre plane or base plane of the ship.

4 STANDARDS FOR HULL WITH DEFECTS

4.1 GENERAL

4.1.1 This Section contains the standards for defective hull members for determining the technical condition of the hull in accordance with the provisions of Section 2.

4.1.2 Reducing the intervals between surveys preceding the repair or scrapping of the ship makes it possible to low the standards for hull members.

4.1.3 On agreement with the Register, the standards determined in accordance with 4.2 may be changed based on the experience in ship operation and calculation estimates.

4.2 STRUCTURES WITH WEAR

4.2.1 Member groups.

4.2.1.1 Permissible residual member group thickness $[S_2]$ shall be determined from Table 4.2.1.1 depending on the average thickness S of the hull member group, calculated in accordance with Section 2, Part II "Hull" of the Rules for INS Surveys, and on the ship's length L , in m, separately for plate elements and their stiffening members (e.g., for deck: deck plates, deck framing, strengthening stripes (if any) form independent member groups).

Ship's hull girder longitudinal (overall) strength is considered to be ensured if the actual member group thicknesses are not lower than those obtained from Table 4.2.1.1.

Table 4.2.1.1

Nos.	Longitudinal member group	Permissible residual thickness $[S_2]/S$, in mm	
		$L \geq 50$	$25 \leq L < 50$
1	Continuous cargo hatch coamings	0,85	0,70
2	Deck plating. Bottom plating with the bilge. Deck and bottom longitudinal framing amidships	0,80 ^{*)}	0,60
3	The same in transitional regions	0,75	0,60
4	The same at the ship's ends	0,70	0,60
5	Inner bottom plating amidships	0,70	0,60
6	The same in transitional regions	0,67	0,57
7	The same at the ship's ends	0,65	0,55
8	Side shell plating, longitudinal bulkheads plating and longitudinal trusses at any section along the ship's length	0,75	0,55
9	Inner skin (inner side) plating, longitudinal side and longitudinal bulkheads framing in any area along the ship's length	0,65	0,55
10	Decks of superstructures and deckhouses with framing made of aluminium alloys	0,80	0,80
11	Walls (bulkheads) of superstructures and deckhouses with framing made of aluminium alloys	0,75	0,75
*)In the absence of continuous side coaming — shall be assumed equal to 0,85.			

4.2.1.2 In Table 4.2.1.1 the as-built member group thickness may be used as S for a ship having the RS class, which has not been changed since construction.

4.2.1.3 When checking the ship's hull girder longitudinal (overall) strength in accordance with the procedure agreed with Register (refer to 3.2.2.3) the following condition shall be met:

$$M_{ult}/M_d \geq K_3 \quad (4.2.1.3)$$

where M_d = design bending moment in cross-section, in kNm;

K = safety factor related to the ultimate bending moment assumed not less than 1,26 for ships in **Zone 1**, not less than 1,19 — for ships in **Zone 2** and not less than 1,15 — for ships in **Zones 3 — 4**.

For members exposed to local loads, K shall be increased by 10 %.

4.2.2 Plates.

4.2.2.1 Permissible residual plating thickness of plates $[S_1]$ is given in Table 4.2.2.1.

Standard values given in Table 4.2.2.1 correspond to the spacing $a_0 = 550$ mm. If the actual spacing $a > a_0$, the thicknesses given in Table 4.2.2.1 shall be increased in proportion to the ratio a/a_0 .

In any case, the permissible residual thickness $[S_1]$ shall not be assumed less than 50 % from the as-built plate thickness.

4.2.2.2 In case of the plate area local wear in certain sections limited by girders or in the girder member area, the permissible residual thickness $[S_3]$ shall be not less than 85 % of the thickness specified in 4.2.2.1.

Table 4.2.2.1

Permissible residual plating thickness $[S_1]$		Permissible residual thickness $[S_1]$, in mm, at length L , in m, for ships in Zones 1 — 4					
Nos.	Structural members	Zone 1 — 2			Zone 3 — 4		
		25	80	140	25	80	140
1	Shell plating						
1.1	Shell plating (except as specified in 1.2 — 1.7)	3,0	3,5	4,4	3,0	3,0	3,9
1.2	Shell plating bounding ballast and fuel oil tanks	3,5	3,9	4,8	3,0	3,5	4,4
1.3	Bilge strake	3,1	4,0	4,9	3,1	4,0	4,9
1.4	Sheerstrake amidships	3,0	3,9	4,8	3,0	3,9	4,8
1.5	Bottom plating of oil tankers without double bottom and side shell plating of oil tankers without double sides in way of cargo tanks	3,6	5,0	5,9	3,6	4,5	5,5
1.6	Bottom plating in the fore end at a height up to $0,04B$ from the baseline	3,5	4,4	5,3	3,0	3,5	4,4
1.7	Side plating in the fore end	3,5	4,4	5,3	3,0	3,5	4,4
2	Deck and platform plating						
2.1	Deck plating (except as specified in 2.2 — 2.8), deck stringer at the ship's ends	2,9	3,8	4,7	2,4	3,3	4,2
2.2	Deck stringer amidships	2,9	3,8	4,7	2,9	3,8	4,7
2.3	Upper deck plating at the ship's ends in way of cross decks, poop deck plating and superstructure deck plating (not contributing to longitudinal (overall) strength) in areas not protected by superstructures. Forecastle deck plating	2,9	3,8	4,3	2,5	2,9	3,4
2.4	Upper deck plating outside amidships, poop deck plating and superstructure deck plating (not contributing to longitudinal (overall) strength) in areas protected by superstructures. Platform plating	2,5	2,9	2,9	2,5	2,5	2,5
2.5	Deck plating of oil tankers in way of cargo tanks	3,8	4,7	5,6	3,3	4,2	5,1
2.6	Deck plating at the ends of the pushed ships	3,8	6,1	7,0	3,8	5,1	6,1
2.7	Deck plating of superstructure contributing to longitudinal (overall) strength amidships and in areas not protected by superstructures	2,9	3,8	4,2	2,4	2,9	3,3
2.8	Superstructure deck plating contributing to longitudinal (overall) strength outside amidships in areas protected by superstructures	2,5	2,9	2,9	2,5	2,5	2,5
3	Inner bottom plating						
3.1	Inner bottom plating in cargo ships (except as specified in 3.2 and 3.3)	3,0	3,9	4,3	2,5	3,4	3,9
3.2	Inner bottom plating in dry cargo ships under hatch openings if loading and unloading by grabs is provided, and deck plating of ships-platforms within the cargo platform	4,7	5,6	6,1	3,8	4,7	5,1
3.3	Inner bottom plating in oil tankers in way of cargo tanks	4,6	5,0	5,5	4,1	4,6	5,0
4	Bulkheads and inner skins (inner sides)						
4.1	Watertight bulkhead and inner skin plating (except as specified in 4.2 — 4.9)	2,5	3,0	3,4	2,5	3,0	3,4
4.2	Fore peak bulkhead plating	2,5	3,4	3,9	2,5	3,4	3,9
4.3	Inner skin (inner side) plating and lower plates of watertight bulkheads in dry cargo ships in way of cargo holds. Inner skin plating as well as plating of transverse bulkheads separating loaded and unloaded compartments in way of cargo tanks of oil tankers (except for the lower strake)	3,3	3,8	4,2	2,9	3,8	4,2
4.4	Watertight bulkhead plating (except for the lower plates) in dry cargo ships in way of cargo holds	2,6	3,1	3,5	2,6	3,1	3,5
4.5	Inner skin (inner side) plating of ships with full opening of cargo holds, lower plates of inner skin of ships with partial opening of cargo holds and transverse bulkheads in way of cargo holds, if loading and unloading by grabs is provided	4,2	4,7	5,1	3,3	4,2	4,7
4.6	Lower plates of inner skin (inner sides) as well as transverse bulkheads separating loaded and unloaded compartments in way of cargo tanks of oil tankers	4,7	5,1	5,6	4,2	4,7	5,1
4.7	Plating of transverse bulkheads separating loaded compartments in oil tankers	2,8	3,3	3,7	2,8	3,3	3,7
4.8	Upper strake of bulkheads of ships-platforms within cargo platform	3,3	5,1	5,1	3,3	4,7	4,7
5	Other structural members						
5.1	Plate structures and girder webs of decks in ships-platforms, and plate structures and girder webs of inner bottom plating in dry cargo ships under hatch openings if loading and unloading by grabs is provided	3,3	5,1	5,1	3,3	4,7	4,7
5.2	Continuous longitudinal hatch coamings	3,3	5,2	6,1	3,3	4,2	5,2
5.3	Transverse hatch coamings	2,5	4,3	4,7	2,5	3,4	3,8
5.4	Plating of machinery and boiler casings, closings of machinery spaces, walls (bulkheads) of superstructures not contributing to longitudinal (overall) strength	2,5	2,5	2,5	2,5	2,5	2,5
5.5	Plating of walls (bulkheads) of superstructures contributing to longitudinal (overall) strength	3,0	3,4	4,3	2,5	3,0	3,9
Notes: 1. If the ship's length differs from that specified in the Table, the residual plate thickness shall be determined by linear interpolation of tabular data.							
2. Residual thickness $[S_1]$ of plates of an ice strake in the shell plating for ice class ships shall be not less than 0,8 of their as-built thickness.							

4.2.2.3 In case of pitting, the permissible residual plate thickness $[S_4]$, in mm, shall be determined from the formula

$$[S_4] = 0,3S_0, \text{ but not less than } 2,5 \text{ mm} \quad (4.2.2.3)$$

where S_0 = as-built plate thickness.

4.2.3 Girders.

4.2.3.1 The permissible residual section modulus $[W_1]$, in cm^3 , of a girder shall be determined from the formula

$$[W_1] = nW \quad (4.2.3.1)$$

where W = girder section modulus, in cm^3 , as required by the Rules for INS Construction;

n = factor to be adopted equal to:

0,80 for primary members and web framing (girders) in way of strengthening;

0,75 for longitudinals of strength deck, sheer strake, upper and lower strake of inner side (inner skin) and longitudinal bulkheads, topside and hopper tanks, inner bottom and bottom amidships, as well as for all web framing (girders);

0,70 for other girders;

0,65 for trapezoidal corrugations.

4.2.3.2 The permissible residual area $[F_1]$, in cm^2 , of a girder web cross-section shall be determined from the formula

$$[F_1] = nF \quad (4.2.3.2)$$

where F = cross-sectional area, in cm^2 , of a girder web, as required by the Rules for INS Construction;
for n , refer to 4.2.3.1.

4.2.3.3 The ratio of the residual web framing (girders) thickness to that required by the Rules for INS Construction shall not be less than 0,6 for deck and bottom longitudinals, and less than 0,5 for all other girders.

4.2.4 Welded and riveted joints.

4.2.4.1 In case of weld wear on a length exceeding 0,3 m, the permissible wear shall be established as follows:

for butt welds — not deeper than the surface of the hull member with the smaller thickness in the joint;

for fillet welds — pass reduction by 1 mm or 20 %, whichever is less.

For welds, the following is not allowed:

wear of butt welds in the shell and deck plating, at which the weld reinforcement height relative to the base metal surface is less than 1 mm exceeding 20 % of the weld length between the parallel adjacent girders;

wear of fillet welds with the fillet weld leg size reduction of over 30 %;

cracks or ruptures of girders and welds connecting girders and plating.

4.2.4.2 Permissible wear of riveted joints shall be established as follows:

for flat and cup heads — not greater than 0,2 of the rivet body diameter;

for countersunk and raised countersunk heads — not deeper than 0,1 of the rivet body diameter; if shallow spot facing or rivet defects are revealed by random drilling of rivets, the permissible wear depth for countersunk heads shall be reduced to 0,05 of the rivet diameter;

the distance from the centre of the marginal row of rivets to the worn plate edge shall not be less than 1,3 of the rivet body diameter;

for riveted joints in structures made of aluminum alloys and steel, the separation of connected plates shall not exceed 2 mm. Where an aluminum alloy plate or its section is connected to a steel plate, a drop of the former exceeding 20 % of its as-built thickness is not permitted.

4.3 STRUCTURES WITH DEFORMATIONS

4.3.1 Permissible indentation extent in one cross-section of the hull, permissible camber for girder in an indentation, permissible rib and deflection cambers are given in Table 4.3.1.

Table 4.3.1

Nos.	Parameter	Value
1	Indentations extent across the ship's breadth in one cross-section $\Sigma b_i/B$ separately for the deck and the bottom (except for the cargo decks of ships-platforms):	
	amidships	0,25
	in transitional regions	0,30
	at the ship's ends	0,35
2	Permissible camber $[f]$ for girder in an indentation, in mm, for bottom and deck (except for the cargo decks of ships-platforms):	
	amidships	60
	in transitional regions	80
	at the ship's ends	100
3	Permissible camber $[f]$ for girder in an indentation, in mm, for cargo decks of ships-platforms:	
	amidships	30
	in transitional regions	45
	at the ship's ends	60
4	Permissible camber $[f]$ for girder in an indentation, in mm, for inner bottom plating of dry cargo ships:	
	amidships	40
	in transitional regions	70
	at the ship's ends	100
5	Permissible camber $[f]$ for girder in an indentation, in mm, for sides, inner skins (inner sides) irrespective of their location along the ship's length	150
6	Permissible relative girder web deviation $[d/h]$ (refer to the Note to 3.3.4.5)	0,15
7	Permissible relative rib camber for deck, bottom and sheer strake (if transversely framed) amidships $[f/a]$	0,05
8	Permissible relative rib camber in other cases $[f/a]$	0,1
9	Permissible relative deflection camber in any area along the ship's length $[f/b]$	0,1
10	Permissible 300 mm-based girder camber $[f_{300}]$, in mm	$840/h$
11	Permissible relative position of girder camber maximum $[f/c]$	0,1
Symbols: B — the ship's breadth for the bottom, for deck — the difference between the ship's breadth and the breadth of cargo hatches; Σb_i — the total length of indentations across the ship's breadth in cross section; a — girder spacing; h — girder depth, in mm.		

4.4 STRUCTURES WITH SUBSTANTIAL CORROSION

4.4.1 Upper ultimate thickness of the hull member with substantial corrosion shall be determined from the following formula:

$$S_{[75\%]} = [S_i] + 0,25(S^* - [S_i]) \quad (4.4.1)$$

where $S_{[75\%]}$ = upper ultimate thickness of the hull member with substantial corrosion, in mm;

S^* = hull member thickness, being decisive value in calculating permissible residual thickness (as-built or calculated according to the Rules for INS Construction — required or minimum), in mm;

$[S_i]$ = permissible residual thickness for total, local wear and pitting ($[S_1]$, $[S_3]$, $[S_4]$), in mm.

5 INSTRUCTIONS AND GUIDELINES FOR THE HULL REPAIRS

5.1 GENERAL

5.1.1 This Section contains provisions for the repair of damaged hulls, which technical condition has been assessed as "not complying" under the provisions of Section 2.

5.1.2 In repaired hull structures, their strength, rigidity and toughness shall be restored to a level not lower than that specified by the Instructions for the technical condition "complying" under the provisions of Section 2.

5.1.3 The repair method shall be in each case determined by the shipowner and agreed with the Register in advance.

5.1.4 As temporary repair, provisional strengthenings, cement boxes, etc. may be accepted until the nearest dry-docking of the ship.

5.1.5 The period of ship's service is established in years if it is less than 5 years, and as a multiple of 5 years, if it is equal to or longer than 5 years.

5.1.6 Technical documentation on hull repair project, such as structural drawings, explanatory and calculation notes, technological charts, sheets, etc. shall be agreed with the Register.

It is permitted not to restore a structure to its as-built condition. When determining structural scantlings, the conditions and period of subsequent ship service shall be considered.

The required thickness of a restored hull member shall not be less than determined from the formula

$$S = [S_1] + (T - T_1)u \quad (5.1.6)$$

where

- S = required thickness, in mm, of a restored hull member;
- $[S_1]$ = permissible residual thickness, in mm, of a restored hull member in case of total wear, determined in accordance with 4.2.2 — 4.2.4 with due regard to 4.2.1;
- T = expected period, in years, of further service of the ship (refer to 5.1.5);
- T_1 = period of special surveys (for passenger ships — 5 years, for other types of ships — 10 years);
- u = average annual wear, in mm/year.

Thickness of a restored hull member S shall not be assumed less than $[S_1]$. The difference in thicknesses between the restored hull member and the existing adjacent hull member shall not exceed 3 mm.

5.1.7 The material to be used for structural repairs shall have the RS certificate.

The replacing or strengthening hull members contributing to longitudinal (overall) strength shall be made of steel with a grade not lower than that used during construction, and of the same or higher strength.

5.1.8 The hull repair procedure shall be agreed with the Register, and repair shall be carried out under the RS technical supervision.

5.1.9 Repaired structures shall be submitted to the Register so that tests stipulated in the Rules for INS Surveys may be carried out where necessary. The provisions of the Rules for INS Construction pertinent to ship stability shall be also taken into account.

5.1.10 The possibility of the ship class renewal/retainment depends on good workmanship of structural repair and satisfactory test results.

5.1.11 When choosing the repair methods and design, the documents listed in Annex 3 to the Rules for the Classification Surveys of Ships in Service are recommended to apply.

5.2 STRUCTURES WITH WEAR

5.2.1 Repair methods.

5.2.1.1 The following repair methods are recommended: replacement, strengthening of hull member or its section, sealing by fusion.

5.2.1.2 Replacing hull members or their sections shall have thicknesses not less than those determined from Formula (5.1.6). When girders are replaced, their intersections with other frames shall be so executed that the structural continuity of primary members is ensured.

5.2.1.3 A hull member or its section may be strengthened by means of the following:

doubling straps increasing the section modulus of hull and girders;

additional girders and stiffeners for increasing for local strengthening of structures;

doublers for local strengthening of structures and ensuring watertightness (as a temporary repair with a due date agreed with the Register), and for the ships with subsequent service of less than 5 years;

girders and stiffeners for increasing the section modulus of hull as well as local strengthening of structures, doublers to ensure local strength and tightness, fitted as defined in IACS recommendation No. 47, adopted as prompt and thorough repair on agreement with the Register according to the established procedure.

When doubling straps and doublers are used on ships covered by of Directive (EU) 2016/1629, the requirements of the instruction ESI-II-2 of ES-TRIN standard shall be additionally taken into account.

5.2.1.4 Doubling straps and/or additional girders and stiffeners for increasing the hull section modulus may only be fitted on the basis of specific calculations on evaluation of the ship's hull girder longitudinal (overall) strength according to 3.2.2.3 based on Formula (4.2.1.3).

5.2.1.5 A doubling strap may have a thickness exceeding by not more than 50 % the residual plate thickness of the structure being strengthened or of 30 mm (whichever is less), and a breadth — not exceeding 50 times its own breadths or of 700 mm (whichever is less). The application of doubling straps with parameters exceeding the above limits is subject to special consideration by the Register in each case.

Before fitting, the surfaces of doubling strap and hull structure to be joined shall be carefully cleaned and adjusted. The clearances between the surfaces of plates being joined shall not exceed 2 mm.

Plug and intermittent welds are not permitted. The quality of 100 % of butt welds in doubling straps shall be controlled. In the case of doubling straps fitted below the waterline, the quality of fillet welds shall be tested by air pressurization with application of a foam compound.

The structural adjustment of doubling strap butts shall be carried out in accordance with Fig. 5.2.1.5-1, and of their ends, in accordance with Fig. 5.2.1.5-2.

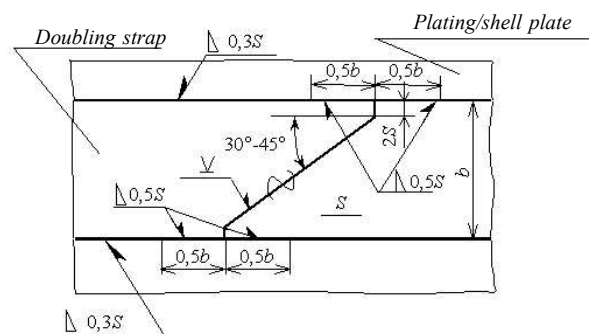


Fig. 5.2.1.5-1 Adjustment of doubling strap butts

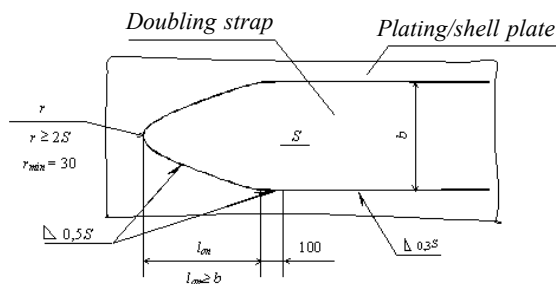


Fig. 5.2.1.5-2 Adjustment of doubling strap ends

5.2.1.6 Doublers used for temporary repair shall comply with the provisions of the documents agreed with the Register as regards their dimensions, material, manufacturing procedure and fitting on the hull member being repaired. No doublers are permitted in areas of intensive vibration and in those areas, to which ice loads are applied.

5.2.1.7 The scantlings of strengthening girders and stiffeners shall be determined analytically bearing in mind the expected service period.

The strengthening girders may be intercostal. Their ends shall be attached to deep framing members following the design applied elsewhere in the hull. If another method of attaching the girder ends is preferred, this shall be considered when determining the scantlings of stiffening girders.

5.2.1.8 The sealing of a hull member section by fusion shall be carried out using electrodes corresponding to the steel grade, of which the repaired section is made.

Before welding, the hull member section shall be carefully cleaned of corrosion products and prepared for welding operations.

Efficient welding procedures providing for the necessary heat input, heat concentration, sequence of making welds or pad welds shall be applied.

When welding operations are completed, the weld or pad weld shall be after treated and tested for the presence of cracks.

5.2.2 Characteristics of the hull cross-section.

5.2.2.1 To restore the necessary characteristics of the hull cross-section, repair is permitted in the form of replacing or strengthening the hull (refer to 5.2.1.4).

5.2.2.2 The scantlings of each repaired member of the hull (side coaming) and the bottom shall be checked for compliance with the buckling strength requirements of the Rules for INS Construction.

5.2.3 Plates.

5.2.3.1 In case of total wear, the thickness of the plate to be replaced shall not be less than that determined from Formula (5.1.6). For shell plates, bulkhead plating and deck plating in areas of intensive vibrations, the replaced plates shall have thicknesses required by the Rules for INS Construction for newbuildings.

Where permitted, the plate temporary repairs may be carried out using the doublers. For members contributing to the longitudinal strength of the hull girder, the possible use of doublers shall be checked by calculations (refer to 3.2.2.3) and agreed with the Register.

5.2.3.2 In case of local wear, the total area of non-adjacent sections being replaced shall not exceed 40 % of the plate area.

The temporary repair of a worn plate section with local wear may be carried out by means of a doubler plate. Plates with linear wear in way of the ice strake and hull areas strengthened for mooring may not be repaired by fitting doubling straps.

Where a worn plate section is repaired by strengthening with intercostal girders or stiffeners, the efficiency of this structural design shall be substantiated analytically.

In this case, the permissible residual plate thickness $[S_3]$ may be reduced bearing the strengthening in mind.

5.2.3.3 Plates with groove wear may be repaired by welding up. The total welded-up area shall not exceed 5 % of the plate section area.

5.2.3.4 For plates with pitting, the pits may be sealed by fusion, observing the same procedures as in the case of plates with groove wear. Pits removed from a riveted seam by less than 50 mm may not be sealed by fusion.

If a plate is repaired by replacing its pitted section, the repair shall be carried out in accordance with the provisions of 5.1.6.

5.2.4 Girders.

5.2.4.1 In case of total wear, the girder shall be replaced completely, if the cross-sectional area of its member lost due to wear exceeds 60 % of its initial value as well as if it is a deck or a bottom longitudinal located amidships.

If a girder is repaired by strengthening in the form of reinforcement of its members, reinforcement throughout the relevant span shall be ensured. For girder strengthening, doubling straps fitted on webs and flanges may be used, as well as rolled section beams. The recommended designs of worn girder strengthening are shown in Fig. 5.2.4.1-1. The section modulus of a strengthened girder may not be increased above the as-built value.

This repair procedure is not permitted for deck and bottom longitudinals amidships.

If a girder is repaired by strengthening in the form of additional girders or supports (web girders) in a grillage (refer to Fig. 5.2.4.1-2), the efficiency of designs adopted shall be substantiated analytically. In this case, the permissible residual thicknesses $[S_1]$ of girder elements may be reduced in view of the strengthening effected.

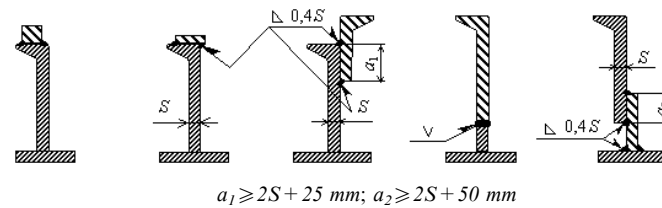


Fig. 5.2.4.1-1 Girder strengthening:

— existing girders; — additional strengthening

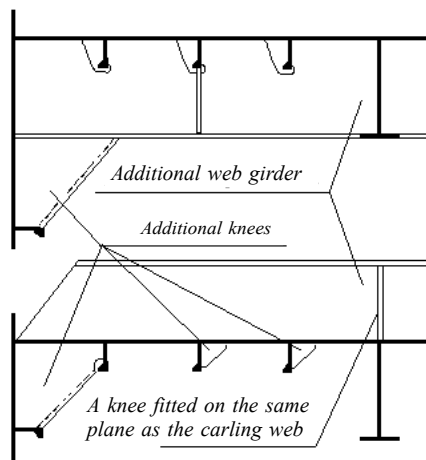


Fig. 5.2.4.1-2 Strengthening of main framing girders with web girders

5.2.4.2 In the case of local pitting or groove wear, a girder element may be replaced on a limited span length in way of wear. The dimensions of the replaced section shall not be less than the as-built dimensions of the girder.

If a girder is repaired by strengthening in the form of reinforcement of its members, the strengthening shall be effected throughout the worn section. If is also permitted for the worn deep girder web areas to be strengthened with stiffeners. The recommended methods of strengthening the girder areas are shown in Fig. 5.2.4.2.

Repair by strengthening is not permitted for the elements of deck and bottom longitudinals amidships.

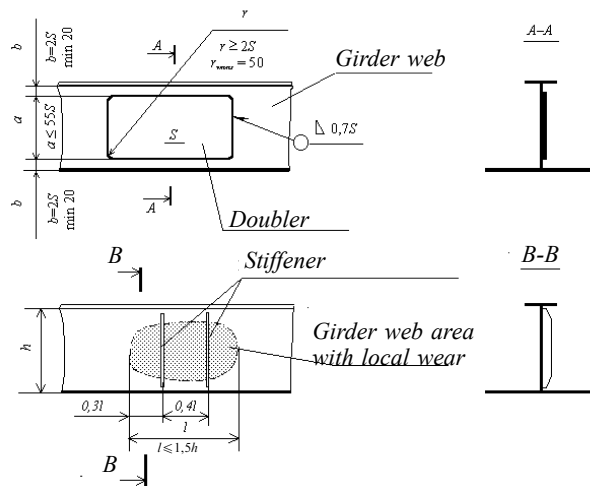


Fig. 5.2.4.2 Strengthening of a girder area

5.2.4.3 In case of pitting, a girder element may, where necessary, be repaired using methods specified in 5.2.3.4.

5.2.5 Welded and riveted joints.

5.2.5.1 Worn welds may be repaired by welding-up. If necessary, particular weld lengths may be cut out and welded anew.

5.2.5.2 Weak, non-waterproof or worn joints shall be re-riveted. When replacing blind rivets, the chamfering depth shall not be greater than 0,9 and less than 0,7 of the residual thickness of the chamfered member.

If an aluminum alloy plate is worn in way of its connection to a steel one, the worn plate area shall be removed, and the riveted joint shall be re-riveted.

In some cases, boxing of non-weakened and waterproof rivets, individual non-waterproof rivets, or electric riveting may be permitted on agreement with the Register.

5.2.6 Connecting elements and local strengthening.

5.2.6.1 In case of total wear, a connecting element shall be replaced, if the girder, which it strengthens, is replaced.

If the girder is repaired by other methods, the worn connecting element may be strengthened, for instance, a stiffener may be fitted on the web plate of a knee connecting web members. In such a case, the efficiency of adopted design shall be substantiated analytically or in another way.

5.2.6.2 In case of local wear, the connecting element may be partially replaced in the area of intensive wear, for instance, at bracket ends, large knees. The thickness of replaced section shall not be less than that of the element remainder.

In some cases, strengthening in the form of doubling straps or stiffeners may be applied for repairing a connecting element section on agreement with the Register.

5.2.6.3 Worn local strengthening shall normally be replaced completely. Where necessary, a partial replacement of the most worn section is permitted.

5.3 STRUCTURES WITH DEFORMATIONS

5.3.1 Repair methods.

5.3.1.1 For hull members with residual deformation, the following repair methods are recommended:
replacement of the hull member or its section;
strengthening of the hull member or its section where residual deformation is present;
flattening.

5.3.1.2 A hull member or its section shall be replaced in accordance with the provisions of 5.2.1.2.

5.3.1.3 A hull member or its section may be strengthened by means of the following:
strings (doubling straps);
girders or stiffeners.

The strings, girders and stiffeners shall be manufactured and fitted bearing in mind the relevant provisions of 5.2.1.3 and 5.2.1.4.

5.3.1.4 Deformation shall be repaired by flattening in accordance with the procedure approved by the Register. The total deformed area of a member shall be intensively heated.

For hull members made of higher strength steels, which were heat-treated, residual deformation repair by flattening is not permitted.

5.3.2 Characteristics of hull cross-section.

For deformed hull members located amidships in the strength deck or bottom may be repaired by means of replacement or strengthening. The acceptability of indentation strengthening shall be analytically substantiated (refer to 3.2.2.3) and agreed with the Register.

The longitudinals of the strength deck and bottom amidships may not be repaired by fitting strings.

5.3.3 Deflections and ribs.

5.3.3.1 Where a hull member containing indentations and ribs is replaced, the thickness of replaced section shall not be less than determined from Formula (5.1.6).

A hull member containing ribs shall be repaired by replacement, if $f'/a \geq 1,5[f/a]$ where f' , a , $[f/a]$ shall be adopted from 3.3.3 and 4.3.1.

5.3.3.2 Deflections and ribs shall be strengthened with girders or stiffeners, which height is not less than 75 % of that of existing girders. A recommended method of deflection and rib strengthening is shown in Fig. 5.3.3.2.

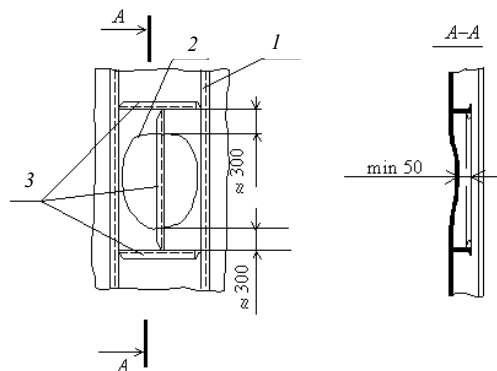


Fig. 5.3.3.2 Strengthening of deflections and ribs with stiffeners:

- 1 – main framing girder;
- 2 – a deflection or rib contour;
- 3 – stiffeners

5.3.3.3 When hull members with deflections and ribs are repaired, one and the same deformed section may be repaired by flattening not more than during two repairs accompanied by mandatory intensive heating of shell/plating in the following cases:

for deflections, in which the deformed shell/plating area (section) does not go as far as the girders, the whole of the area, in which the deflection is formed, shall be covered;

for ribs and deflections, in which the deformed shell/plating area (section) goes as far as the girders, along the framing and in way of the maximum camber.

5.3.4 Indentations and bulges.

5.3.4.1 A hull member with a rupture (ruptures) and containing an indentation or a bulge shall be repaired by replacement, if it is not possible to eliminate the rupture by welding-up in accordance with 5.4.1.4.

Where a member containing indentations or bulges is replaced, the thickness of the replaced section shall not be less than that determined from Formula (5.1.6).

Primary members in way of an indentation shall be repaired by replacement, if $f'/l' > 2[f/l]$ and $f'_{300} > 2[f_{300}]$ where f' , l' , $[f/l]$, f'_{300} , $[f_{300}]$ shall be adopted from 3.3.4 and 4.3.1.

A hull member containing a bulge shall be repaired by replacement where $f'/l' > 2[f/l]$.

5.3.4.2 It is permitted for the structure in way of an indentation to be strengthened by fitting additional girders or stiffeners, for instance, intermediate frames, and stringers. The efficiency of strengthening shall be analytically substantiated with due regard to the parameters of the particular indentations.

If the conditions of 2.3.3.3 are not met by only the girder webs deviating from their initial plane, it is recommended that they be strengthened with strings welded to the upper surface of face plates perpendicularly to their direction (refer to Fig. 5.3.4.2-1).

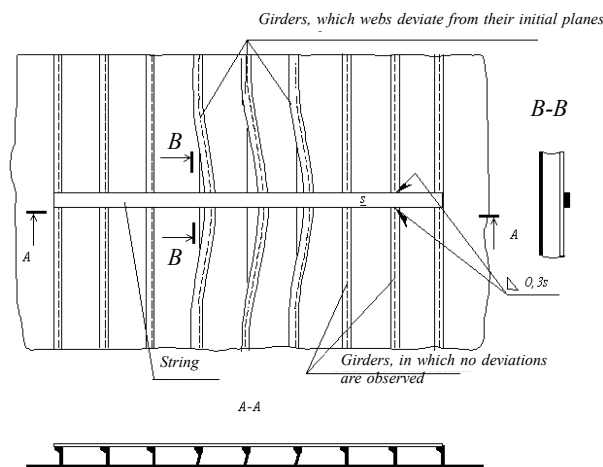


Fig. 5.3.4.2-1 Girders strengthening with a string

When strings are fitted, they shall exceed the damaged area by two spacings to each side at least. The cross-sectional area of a string shall be chosen close to that of the girder face plate.

Where the conditions of 2.3.3.3 are not met, bulges may be strengthened with stiffeners provided $f'/l' > 2[f/l]$. The recommended methods of bulged girder web strengthening are shown in Fig 5.3.4.2-2. The thickness of strengthening stiffener shall be adopted equal to the strengthened girder web thickness, and the minimum stiffener web height shall be determined from the condition $h_{\min} \geq 5S$.

5.3.4.3 When indentations are repaired, only those sections may be flattened, which were not subjected to flattening during previous repairs, with a simultaneous intensive heating of the girder in way of maximum camber and shell/plating with adjacent girder web on the indentation contour. When indentations with bulges are flattened, the provisions of 5.3.3.3 for deflections shall also be met.

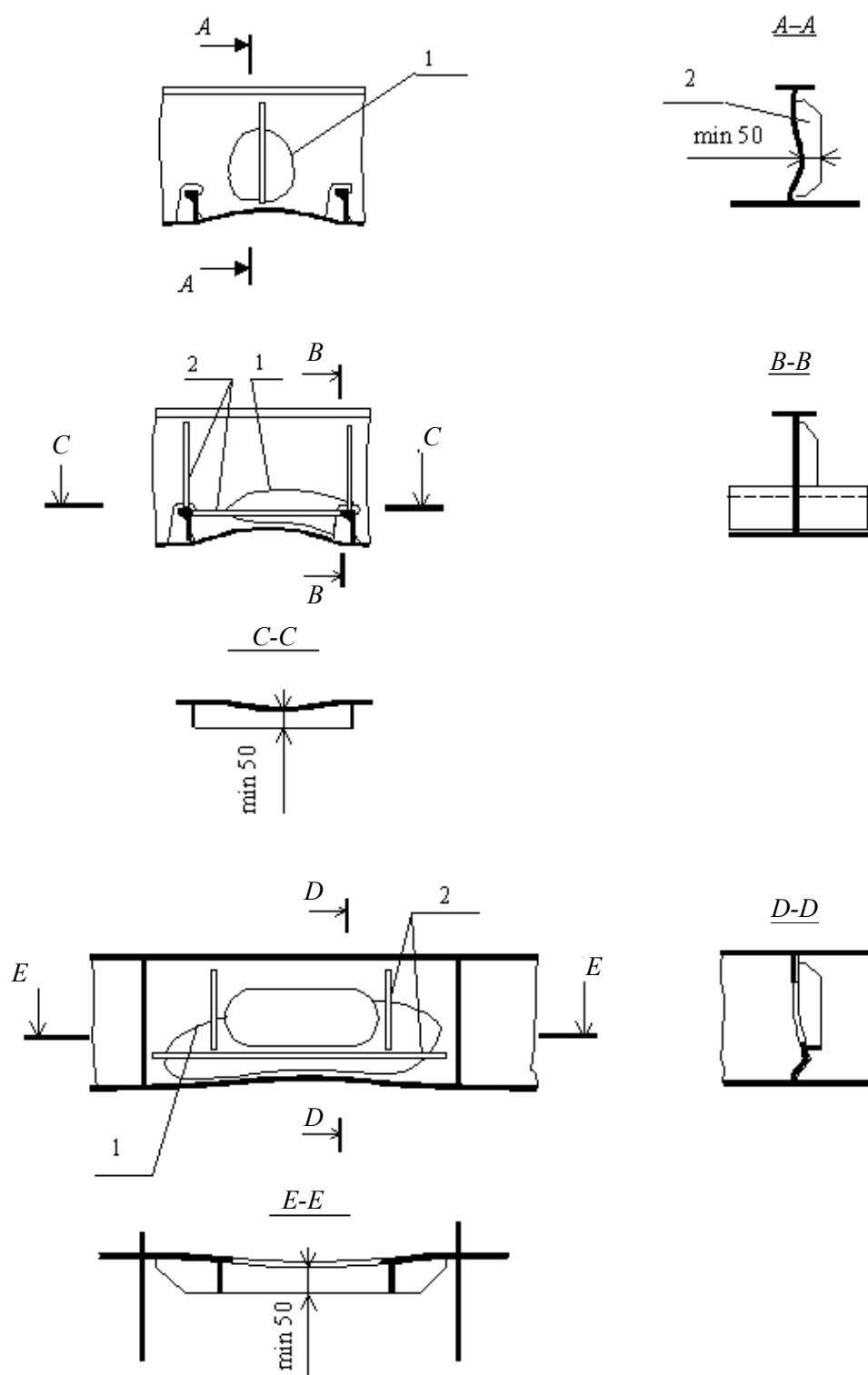


Fig. 5.3.4.2-2 Bulge strengthening:
1 – bulge contour; 2 – stiffener

5.3.5 Connecting elements and local strengthening.

5.3.5.1 Knees with deformed face plates shall be repaired by replacement.

5.3.5.2 Deformed knees without a face plate/flange, as well as knees with a non-deformed face plate/flange may be strengthened with stiffeners.

5.3.5.3 Deformed local strengthening shall be repaired by replacement.

5.4 STRUCTURES WITH CRACKS AND RUPTURES

5.4.1 Repair methods.

5.4.1.1 For hull members with fractures and ruptures, the following repair methods are recommended: replacement of the hull member section, in which a fracture or rupture is contained, without further reinforcement/modification;

replacement of the hull member section containing a fracture or rupture with further reinforcement/modification of the structure;

welding-up.

5.4.1.2 Replacement of the hull member section with a fracture without further reinforcement/modification is recommended when the fractures are caused by:

- .1** internal defects or low quality of material;
- .2** low quality of welding or poor manufacturing quality of the structure;
- .3** overheating or burning of material (due to fire, flattening and welding);
- .4** lean-on, grab or cargo impact, etc.;
- .5** metal lamination.

Detailed information is given in the internal normative documents on repair intended for the use of the RS surveyors.

The dimensions of member section to be replaced shall be determined as the greater of the following: the section and the fracture shall completely overlap in length with an addition of at least 30 mm along the direction of the crack propagation from its peak (refer additionally to the internal normative documents on repair intended for the use of the RS surveyors);

the border of the section shall lie outside the hull member area with stress concentration due to its shape;

the dimensions of the section shall render technological operations possible on the level of workmanship required for the repair.

Hull members with ruptures shall be repaired by replacement. Hull members not subjected to forces due to the longitudinal bending of hull with ruptures may be repaired with doublers as temporary strengthening until the next scheduled repair provided the rupture is welded up taking into account 5.4.1.4. In this case, a doubler shall go beyond the edge of a rupture for at least $2S + 25$ mm, where S is the smaller thickness, in mm, of the plates joined.

5.4.1.3 Replacement of the hull member section with a fracture together with reinforcement/modification is recommended in the following cases:

- .1** when rigid points, stress concentration and other structural failures are present;
- .2** in case of hull or machinery vibration;
- .3** in case of branched progressing fractures where possible reasons of cracking are the failures stated in 5.4.1.3.1 and 5.4.1.3.2.

Replacement of the hull member section with a fracture together with structural modification/reinforcement may also be recommended based on the experience of technical supervision of ships of the series or similar ships.

Structural modification/reinforcement consists in improving the structure for the purpose of cracking elimination in future.

The efficiency of structural design suggested shall be substantiated, and the design shall be agreed with the Register.

5.4.1.4 Welding-up of a crack is recommended in the following cases:

possible reasons of cracking are slag inclusions, cavities and other internal defects of material, technological errors, poor assembly and manufacturing quality of the structure, as well as operating errors and abnormal service conditions (foul, impact, collision, grounding, etc.).

For hull members with ruptures and containing deflections and indentations, welding-up of ruptures is permitted where the separation distance does not exceed the allowances for edge preparation before welding.

Welding repairs of cracks and ruptures shall be carried out in accordance with the procedure approved by the Register (refer to IACS recommendation No. 47). The crack and rupture edges shall be prepared for welding, and the crack end shall be drilled. The opening diameter shall not be less than the plate thickness.

5.4.1.5 In all cases when the hull members with cracks and ruptures are repaired, the choice of welding consumables, material of section to be replaced and repair procedure shall be in accordance with 5.1.7 and 5.1.8.

5.4.2 Hull members.

5.4.2.1 The cracks and ruptures in hull members contributing to the longitudinal (overall) strength may be welded up in cases specified in 5.4.1.4 when their length does not exceed the standards established in Table 5.4.2.1. In other cases, the provisions of 5.4.1.2 and 5.4.1.3 shall be met.

Table 5.4.2.1

Hull member	Permissible crack length $[\lambda]$, in mm	
	steel, for which $R_{eH} = 235$ MPa, and aluminum alloy	higher strength steel
Plates	200	150
Girders	$0,1h$ but not greater than 100 mm	$0,075h$ but not greater than 75 mm
Connecting elements and local strengthening	$0,1c$ but not greater than 100 mm	$0,075c$ but not greater than 75 mm
Note: h = girder depth, in mm; c = knee side, length, in mm, of the side of local strengthening, along which the crack propagates. The permissible crack length $[\lambda]$, in mm, may be specified by using special procedures agreed with the Register.		

5.4.2.2 Plates and girders with cracks and ruptures shall be repaired in accordance with the provisions of 5.4.1.2 — 5.4.1.5.

5.4.2.3 Weld lengths with cracks shall be cut out to sound metal and then shall be welded up on lengths not less than determined in 4.2.4.

Weld lengths with ruptures may be welded up after residual deformation elimination whenever possible.

Repair work shall be carried out following the provisions of 5.2.1.4.

5.4.2.4 Lengths of riveted joints with cracks and ruptures taking up loads arising from hull buckling shall be replaced and re-riveted.

Cracks and ruptures in riveted joints, by which tightness is ensured, may be welded up in cases stipulated in 5.4.1.4. In other cases, the provisions of 5.4.1.2 and 5.4.1.3 shall be met.

5.4.2.5 A connecting element section containing a crack and a rupture shall be repaired in accordance with the provisions of 5.4.1.2 — 5.4.1.5. Where the crack length is commensurate with the connecting element dimensions, the element as a whole shall be replaced or modernized.

5.4.2.6 The necessity of and repair method for local strengthening containing cracks and ruptures shall be determined based on the experience in technical supervision. Welding-up of a cracked strengthening section is permitted without drilling the crack end and edge preparation.

5.5 GENERAL REQUIREMENTS FOR TECHNICAL SUPERVISION DURING REPAIR OF HULL STRUCTURES

5.5.1 General requirements for technical supervision during repair of hull structures are specified in 5.5 of Annex 2 to the Rules for the Classification Surveys of Ships in Service.

6 PROCEDURE FOR RECORDING THICKNESS MEASUREMENTS AND OTHER DEFECT PARAMETERS

6.1 GENERAL

6.1.1 Procedure for drawing up the reports containing results of the ship's hull technical condition assessment in accordance with 2.1.5 of these Instructions is specified in 6.2 of Annex 2 to the Rules for the Classification Surveys of Ships in Service.

6.1.2 Report table forms for drawing up the results of measurements of thickness and deformation/crack parameters can be downloaded from the RS official website (www.rs-class.org) in section "Additional information on survey of ships in service", together with the appropriate instructions for their filling-in.

6.1.3 Where the measurements of thickness and deformation/crack parameters are performed by one TM service supplier, it is recommended that the tables with records of deformation and crack parameter measurements together with the diagrams be attached to the thickness measurements report. In this case, the cover page shall include the information on the actual content of the document (e.g. the title shall be corrected as follows: "Report on thickness, residual deformation and cracks measurements").

6.2 ADDITIONAL REQUIREMENTS OF DRAWING UP THE REPORTS WITH FLAW DETECTION RESULTS

6.2.1 When drawing up and verifying the reports specified in 6.1, the provisions of 6.4 of Annex 2 to the Rules for the Classification Surveys of Ships in Service shall additionally met.

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