Russian River Register

Rules 2015

The present edition contains:

Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships (RTSC);
Rules for Classification and Construction of Ships (RCCS);
Rules for Prevention of Environment Pollution from Ships (RPPS).

The Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships have been approved by the Order of Federal Autonomous Institution “Russian River Register” No. 36-II dated 09.09.2015 and have come into force since the effective date of the Decree of the Ministry of Transport of Russian Federation which has cancelled the Decrees of the Ministry of Transport of Russian Federation No. HC-137-p dated 11.11.2002 and No. HC-140-p dated 22.11.2002.

Amendments to the abovementioned Rules have been made in accordance with the Order of Federal Autonomous Institution “Russian River Register” No. 78-п dated 7.11.2016.

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1 GENERAL PROVISIONS

1.1 APPLICATION

1.1.1 The present Rules for Technical Supervision During Construction of Ships and Manufacture of Materials and Products for Ships (hereinafter referred to as the Rules), which are based on and develop further the Regulations for Classification and Survey of Ships (hereinafter referred to as the Regulations for Classification), establish the types, procedures, methods and scope of technical supervision performed by the River Register in order to check compliance with requirements of the Rules for Classification and Construction of Inland Navigation and River-Sea Navigation Ships (hereinafter referred to as the RCCS) and Rules for Prevention of Environment Pollution from Ships (hereinafter referred to as the RPPS).

1.1.2 These Rules are used by the River Register for technical supervision during construction, conversion, modernization and repair of ships, manufacture of materials and products, repair of products to be used on the ships and during review and approval of technical documentation.

1.2 TERMS AND DEFINITIONS

1.2.1 Terms and their definitions related to the general terminology of the Rules are given in 2.1 Part 0 of RCCS.

1.2.2 For the purpose of these Rules the following terms and definitions are used:

.1 Random inspection — see 2.2.6 Part 0 of RCCS;

.2 Statement of conformity means the manufacturer’s document confirming compliance of the manufactured items under technical supervision with the Rules and technical documentation approved by the River Register. The form of the Statement of Conformity is established by the River Register;

.3 Manufacturer means a legal entity or individual entrepreneur constructing a ship, manufacturing and supplying materials and/or products for ships or transferring a right to supply to another legal entity or individual entrepreneur, modernizing the products for ships, officially applying the trademark or other distinctive mark on ships and products, thus assuming the manufacturer’s obligations;

.4 Product of mass production (mass produced product) means a product which belongs to periodically repeated batches of manufactured or repaired products;

.5 Type approval tests mean check tests of materials or products carried out to determine compliance of their properties (characteristics) with the approved technical documentation and Rules;

.6 Testing laboratory means a legally independent testing laboratory or subdivision of the organization performing the tests prescribed by the Rules during construction, conversion, modernization and repair of ships, manufacture of materials and products, repair of products (see 2.8.1.5);

.7 Approved is a term used by the River Register upon satisfactory results of checking compliance of materials and products with the requirements of the Rules;

.8 Type approval of a material or product means defining the compliance of type specimens of the material or product manufactured in the course of continuous production with the requirements of the Rules by the River Register;
.9 Classification organization means an organization authorized by the RF Ministry of Transport for classification and survey of ships;

.10 Test program means a document establishing the item, types, sequence and scope of the performed tests, procedure, terms, place and time frame of the tests, support and reporting for the tests as well as responsibility for their support and performance;

.11 Test report means a document containing the information on the item under test, used methods, means and conditions of the tests, test results as well as evaluation of the test results;

.12 Single delivery means a material or product delivered one time for the ships classed by the River Register or constructed to this class;

.13 Ship repair means a set of operations on recovery of serviceable or operable condition of the ship for a specific period of time;

.14 Certificate means a document of the River Register confirming that the considered materials or products comply with the requirements of the Rules and approved technical documentation;

.15 "APPROVED" is a stamp used by the River Register to confirm compliance of technical documentation with the requirements of the Rules;

.16 Bench tests mean tests performed using test equipment;

.17 Technical documentation means design and process documentation as well as other technical documents for items under technical supervision which include data required to check compliance with the requirements of the Rules;

.18 Type material or product means a material or product related to a group of materials or products with similar physical and mechanical properties or structural and technological features. They are used as intended without attributing to a specific ship or item under technical supervision;

.19 Type specimen means a specimen of type material or product used during the test and inspection;

1.3 HEAD OFFICE ACTIVITIES

1.3.1 As regards technical supervision during designing, construction of ships, manufacturing of materials and products, the Head Office:

.1 reviews and approves engineering designs for construction of ships;

.2 reviews draft national standards;

.3 reviews and approves technical documentation for materials and products when approving a material or product type as well as technical documentation for overhaul of internal combustion engines;

.4 reviews and approves engineering designs for transfer of class for the ships;

.5 reviews and approves software applications used for designing;

.6 participates in technical supervision during trials of prototype ships (items) constructed according to the designs approved by the River Register;

.7 undertakes technical supervision during tests of material and product type specimens manufactured according to the documentation approved by the River Register and issues material or product type approval certificates;

.8 checks ship document copies issued by Branch Offices for prototype ships after construction or conversion;

.9 reviews and approves a list of replacements equivalent to the requirements of the Rules;

.10 undertakes technical supervision for compliance with the Rules during manufacture of materials and products when manufacturers are outside the activity of Branch Offices and issues respective documents;

.11 carries out surveys of firms engaged in manufacturing of materials/products and in work according to the requirements of the River Register, as well as testing laboratories performing tests prescribed by the Rules, if they are outside the activity of Branch Of-
ices, draws up and issues recognition certificates for these firms and laboratories;

1.12 ensures overall management of Branch Offices, makes technical and other decisions regarding issues arising from Branch Offices activities;

1.13 improves normative classification documents.

1.4 BRANCH OFFICE ACTIVITIES

1.4.1 As regards technical supervision during designing, construction, modernization, conversion and repair of ships, manufacture of materials and products, repair of ship equipment, the Branch Office:

1.1 reviews and approves engineering (detailed) designs:

for berth-connected ships, industrial ships, custom-built self-propelled and non-self-propelled ships of other types and purposes, except tugboats, icebreakers, high-speed craft, WIG craft and ships of new design;

for hull stiffening or ship preparation for operation or single voyage (passage) outside the specified area of navigation;

for conversion, modernization and repair of ships of all types and purposes, except for transfer of class for the ships;

for repair of boilers;

for repair of custom-built ship machinery;

for repair of hoisting gear;

1.2 reviews and approves detailed documentation for ships under construction, conversion, modernization and repair;

1.3 reviews and approves technical documentation for materials and products for which type approval is not provided;

1.4 undertakes technical supervision for compliance with the Rules during construction, conversion, modernization and repair of ships, manufacture of materials and products;

1.5 undertakes technical supervision for compliance with the Rules during repair of ship machinery and overhaul of engines;

1.6 prepares and issues documents of the River Register for constructed, converted, modernized and repaired ships as well as submits copies of these documents to the Head Office in the specified extent;

1.7 reviews and approves standards of firms and process procedures;

1.8 carries out survey of firms and testing laboratories, except those outside the activity of the Branch Office, draws up and issues recognition certificates;

1.9 carries out other activities on behalf of the Head Office including those specified in 1.3.
2 GENERAL PROVISIONS ON TECHNICAL SUPERVISION

2.1 GENERAL REQUIREMENTS

2.1.1 Technical supervision during manufacture of items under technical supervision is performed by stagewise inspections of these items during manufacture, including the final stage of manufacture (finished materials or products).

Inspections are carried out by the River Register's surveyor or the firm's person authorized by the River Register after inspection of the manufactured materials and products by the manufacturer's personnel and preparation of documents on workmanship, manufacture or installation of items under technical supervision by this firm.

During inspections, the River Register's Surveyor or the firm's person authorized by the River Register shall not make decisions different from those prescribed by the Rules.

For the Nomenclature of items under the River Register technical supervision (herein after referred to as the Nomenclature) and types of technical supervision, see Table A1.1.

2.1.2 All the activities related to technical supervision are carried out by the River Register upon request and normally against the contracts with the firms in charge of design, construction, conversion, modernization and repair of ships as well as manufacture of materials and products for shipbuilding and ship repair.

2.1.3 Quality checks of items under the River Register technical supervision are performed using the methods specified in these Rules and cover only the properties of items prescribed by these Rules.

2.1.4 While performing technical supervision the River Register does not replace the functions of the firm's and ship owner's quality control departments.

2.1.5 Technical supervision during manufacture of materials and products, construction, modernization and conversion of ships is performed according to the approved technical documentation and production processes.

If the materials and products specified in the Nomenclature are manufactured and/or tested according to national standards, the use of which provides compliance with requirements of the Rules, technical supervision is performed considering the requirements of these standards.

2.1.6 The procedure for review and approval of technical documentation on items under technical supervision, scope of surveys during technical supervision in the firm and process operations subject to inspection are determined in the relevant sections of the Rules.

2.1.7 The River Register on a contract basis may assign (entrust) technical supervision during construction of ships or manufacture of materials and products to another classification society or competent organization recognized by the River Register as well as accept an assignment of another classification society or other organization to perform technical supervision.

Scope and procedure for technical supervision as well as the form and list of documents issued in these cases are specified in respective agreements (see 2.7).
2.1.8 Materials and products which are items under technical supervision can be installed on board the ship if there are certificates or other documents issued by the River Register or documents of another classification organization issued on behalf of the River Register confirming compliance of concerned materials and products with requirements of the Rules.

2.1.9 Technical supervision of materials and components manufactured by the organization and used in this organization for manufacturing products as well as during construction or repair of ships is performed by the surveyor within technical supervision during manufacture of products, construction and repair of ships. Performance of technical supervision is confirmed by a record in the Notice of surveyor invitation (hereinafter referred to as the Notice), the form of which is given in Appendix 2.

When manufacturing the above materials and components to be further delivered to other organizations, including when they serve as interchangeable parts, technical supervision is performed according to the forms specified in the Nomenclature with issue of the documents specified in 2.2.6.

The Notice of submitting the work shall include information on the welders who carried out the submitted work, if the requirements for welding the structures and items are prescribed by the Rules (see 2.9.1) including their family name, name and patronymic (if any) as well as details of the Welder Approval Certificate.

2.1.10 New materials and products (including those under preservation) without documents of the River Register, may be allowed for installation on board ship or for manufacture of products according to the results of their survey as follows:

1. Shipbuilding or ship repair organization, manufacturer of products shall submit the manufacturer's documentation on materials and products in the scope sufficient to determine compliance of materials or products with requirements of the Rules as well as a test program which allows to assess compliance with the requirements of the Rules.

The documentation shall be sent with the Notice which includes the name of the material or product and its identification details (e.g., name of the manufacturer, serial or batch number);

2. The "Taken into consideration" stamp shall be put on the reviewed documentation and test program in case of compliance with the requirements of the Rules;

3. In case of compliance of the documentation with the requirements of the Rules, tests shall be performed in the testing laboratory recognized by the River Register according to the test program taken into consideration. According to the test results, the testing laboratory which tested the material or product shall draw up a test report;

4. The surveyor shall perform survey of the material or product in the scope specified by the Rules;

5. Compliance of the material or product with the requirements of the Rules is confirmed by issue of a Certificate (Form PP-1.25.1) for the products with a personal identification number. For the products without a personal identification number and materials – with a record in the Notice which was sent with the material or product to the surveyor to perform survey.

The test report and documentation taken into consideration (copy of documentation) are to be attached to the Notice on the basis of which the surveyor performed survey of the material or product.

The survey results apply only to the materials or products which were submitted under the Notice, specified in 2.1.10.1 and which were subject to the survey specified in this paragraph.

At repeated submission of the materials or products specified in this paragraph for survey to the River Register, survey shall be performed according to the requirements of this paragraph in full.

2.1.11 Materials or products are not subject to survey according to the procedure specified in 2.1.10 in the following cases:
.1 Materials and products have a valid material or product type approval certificate;
.2 A material or product is used for construction of the ship series;
.3 Products with similar characteristics have a valid material or product type approval certificate.

2.1.12 Materials and products which are planned to be installed on ships during modernization, conversion or repair, are dismantled from the ships which are/were classed by the River Register as agreed with the Branch Office.

Dismantling of the materials or products which are planned to be installed on ships during modernization, conversion or repair in case they have no documents of the River Register confirming their compliance with the requirements of the Rules (Forms ÐÐ-8.1, ÐÐ-8.3, ÐÐ-1.25) is performed in the presence of the River Register's surveyor.

A report on survey of the dismantled materials and products (Form ÐÐ-10.3) is prepared for the dismantled materials and products, except for the cases specified in the fourth and fifth subparagraphs of this para.

If the dismantled products have no documents required to determine their technical condition, and the main and auxiliary engines have no files, datasheets or other documents including information of the manufacturer on the assigned and remaining life (service life), a Report on survey of the dismantled products is not prepared and it is not allowed to install the products on the ships classed by the River Register.

A Report on survey of the dismantled products is not prepared if the product has River Register documents confirming their compliance with the requirements of the Rules (Forms PP-8.1, PP-8.3, PP-1.25).

Materials or products without an individual identification number which were subject to survey at dismantling are identified by the surveyor using any suitable method – stamp or seal of the surveyor (e.g. on the label), etc.

2.1.13 Materials or products dismantled from the ships classed by the River Register with the determined technical condition specified in the fourth and fifth subparagraphs of this para can be installed on other ships during modernization, conversion or repair if they have the River Register documents (Forms PP-8.1, PP-8.3, PP-1.25) or a report on survey of the dismantled materials and products (Forms PP-10.3), as well as documentation required by RSSS to determine technical condition of products.

Main and auxiliary engines, in addition to the above, shall have files, datasheets or other documents including information of the manufacturer on the assigned and remaining life (service life).

The decision on possibility of installing the materials and products dismantled from other ships classed by the River Register shall be taken by the Branch Office performing technical supervision during modernization, conversion or repair of the ship by results of determining technical condition of materials and products.

Technical condition of materials or products specified in the first subparagraph of this para and planned to be installed on ships is determined according to Appendices 2 to 4 of RSSS as regards products or according to Part X of RCCS as regards materials.

According to results of determining technical condition, repair of products is performed in the required scope, if necessary. Technical supervision during repair of the products is performed according to the requirements of these Rules.

According to results of determining technical condition of the products, satisfactory results of mechanical tests and determining chemical composition of the materials as well as technical supervision during repair of the products, a Certificate (Form PP-1.25.1) is drawn up for the products with a personal identification number or a Certificate (Form PP-8.3) for a thoroughly repaired engine. For the products without a personal identification number and materials, records are made in the Notices which where sent with the material or product to the surveyor to perform survey.
2.2 FORMS OF TECHNICAL SUPERVISION

2.2.1 The following types of technical supervision during construction, conversion, modernization and repair of the ships, manufacture of the materials and products are prescribed by these Rules:

.1 Technical supervision of the surveyor (Form P) means technical supervision performed by the River Register;

.2 Technical supervision of the River Register and organization (Form OP) means technical supervision during manufacture of materials and products performed together with the River Register's surveyor and organization personnel;

.3 Technical supervision of the surveyor using a type approval (Form ÏÄ) means technical supervision during manufacture of materials and products performed by the River Register at type approval without participation in acceptance of the end material or product;

.4 Technical supervision in the form of Recognized documentation (Form ÏÄ) means technical supervision when compliance of the material or product with the requirements of the Rules is confirmed only by review and approval of technical documentation without supervision during its manufacture or installation (assembly) on the ship;

.5 Technical supervision by another classification organization means technical supervision performed by another classification society on behalf of the River Register (under agreement with the River Register).

2.2.2 Forms of technical supervision specified in columns 2 and 3 of the Nomenclature apply to the materials and products subject to repeated deliveries. Technical supervision during single deliveries is performed according to 2.3.18 and 2.3.19. The results of documentation review and of the tests during single deliveries apply only to the declared item under technical supervision.

2.2.3 In the cases prescribed by the Nomenclature (column 3), the organization together with the River Register may select a form of technical supervision — P or OP.

The possibility of using a form of technical supervision (OP) is determined by the Branch Office (Head Office) by results of the manufacturer survey. The decision on the used form of technical supervision is specified in the Recognition Certificate.

2.2.4 Technical supervision during construction, modernization, conversion and repair of ships, approval of material and product type is performed only by the River Register's surveyor or personnel of another classification organization on behalf of the River Register or under agreement with the River Register (see 2.7).

The tests prescribed by the Rules shall be carried out by the testing laboratories with a Recognition Certificate of the River Register to perform these tests. The tests in the presence of the surveyor are performed if is prescribed by the Rules, or if the testing laboratory is not recognized by the River Register to perform these tests.

Participation of the surveyor in ship trials and tests of materials and products as well as in welders' qualification tests, is confirmed by the surveyor's signature under "Carried out at surveyor's technical supervision/survey" inscription applied to the document prepared by results of trials/tests (report).

2.2.5 For the procedure of technical supervision during manufacture of materials and products, see Table 225.

The applicant may send a request to the River Register for each procedure separately or for a few procedures of technical supervision.

In case of single deliveries (see 2.2.2), recognition of the manufacturer is not required.

2.2.6 According to results of technical supervision of the materials and products depending on the used form of technical supervision (third column of the Nomenclature), the following documents confirming their compliance with the requirements of the Rules are issued:
Table 2.2.5

Forms and procedures of technical supervision during manufacture of materials and products

<table>
<thead>
<tr>
<th>Types of use of forms of technical supervision</th>
<th>Forms of technical supervision</th>
<th>Procedures of technical supervision</th>
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<tbody>
<tr>
<td></td>
<td>Type specimen (column 2 of the Nomenclature)</td>
<td>Serial products (column 3 of the Nomenclature)</td>
</tr>
<tr>
<td>1</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td>1a</td>
<td>—</td>
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<td>2</td>
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<tr>
<td>3</td>
<td>P</td>
<td>OT</td>
</tr>
<tr>
<td>4</td>
<td>—</td>
<td>ПД</td>
</tr>
</tbody>
</table>

.1 Form P — for manufacture of the materials and products (Form PP-8.1), repair of the products — Certificate (Form PP-1.25), overhaul of the engines — Certificate (Form PP-8.3);
.2 Form OP — Certificate (Form PP-8.1);
.3 Form OT — manufacturer's document with information on Type Approval Certificate (see 2.3.13) specifying its date and number or attaching copy of this Certificate;
.4 Form ПД — manufacturer's document with the date and number of the letter on approval of technical documentation according to which the material or product is manufactured.

2.2.7 One Certificate is issued for materials and products manufactured in batches.

In this case each product shall be delivered with the manufacturer's documents with references to this Certificate. The supporting documentation on the delivered product (batch or its part) shall include a copy of a Certificate endorsed by the manufacturer.

If the Certificate was issued for a unit of product, it shall be delivered with the original Certificate.

2.2.8 According to results of technical supervision, documents prescribed by RSSS are issued for the ship, depending on type of survey, which is the completion of technical supervision during construction, conversion, modernization or repair of the ship.

2.3 TECHNICAL SUPERVISION
BY THE SURVEYOR (FORM P)

2.3.1 To determine the scope and procedure of inspections, the items under technical supervision opposite which symbol P is placed in columns 3, 5 to 7 of the Nomenclature, the River Register and manufacturer shall prepare a checklist for the items and process operations (hereinafter the Checklist). The Checklist includes items under technical supervision specified in the Nomenclature as well as separate process operations and works carried out under technical supervision of the River Register. For the Form of the Checklist, see Appendix 3.

2.3.2 The Checklist is prepared on the basis of the requirements of the Rules considering specific conditions of technical supervision.

The Checklist is an Appendix to the Agreement on technical supervision.

Each presentation to the River Register, covering one or several uniform items under technical supervision or scope of works completed at the particular stage of manufacture shall correspond to each item of the Checklist. Construction sequence and conditions of manufacture of critical parts and product assembly shall be taken into account.

For the standard Checklist, see Appendix 4.

2.3.3 To perform inspections and participate in the tests of the items under technical supervision, a written Notice shall be sent to
the surveyor not later than one day before the date of the inspections and tests.

If the requirements of the Rules are violated, the surveyor shall impose requirements on elimination of the detected violations and repeated submission of the item under technical supervision for inspection or tests. After observing the requirement, a repeated Notice shall be sent to the surveyor.

2.3.4 The surveyor shall record the results of the inspections and tests of the items under technical supervision in the Notice as well as in the construction book (if any), the form of which is given in Appendix 5.

2.3.5 In addition to the inspections according to the Checklist, the surveyor checks quality of the manufactured parts, assemblies and structural components included in the items under technical supervision submitted according to the Checklist, observing the production processes approved by the River Register (see 3.1.10), compliance with the conditions of issue of a Recognition Certificate and/or Agreement on technical supervision. The results of the inspections are recorded in the Record Book of Technical Supervision, the form of which is given in Appendix 6.

2.3.6 When detecting defects which require elimination, the item under technical supervision shall be submitted for repeated inspection by the River Register after elimination of these defects.

2.3.7 According to results of the performed inspections and tests of the materials or products, the surveyor shall draw up respective documents of the River Register. In the cases specified in 2.1.12 and Appendix 1, the materials and products are sealed. Information on availability of the River Register seal on these materials and products is specified on the issued documents of the River Register.

Approval of material and product type

2.3.8 As regards items under technical supervision, opposite which symbol P is put in column 2 of the Nomenclature, type approval procedure is performed.

2.3.9 To receive a material or product type approval certificate, the organization shall send a request to the River Register.

Together with the request, technical documentation on the material or product (see 3.4) shall be submitted in the scope sufficient to determine compliance of the declared material or product with the requirements of the Rules.

2.3.10 During review and approval of technical documentation, scope and procedure of technical supervision during tests of the declared items under technical supervision is established. The scope of tests shall be not less than that prescribed by the Rules for type materials and products.

2.3.11 For different sizes of the product, tests of type specimen, the structure of which considers the main features of the whole range of products, shall be performed.

Tests of the materials and products shall be performed by the testing laboratories and manufacturer's Branch Offices recognized by the River Register (see 2.8.7).

During type approval, the test results performed maximum six years before the date of type approval in the presence of the River Register's surveyor or another classification society employee acting on behalf of the River Register (see 2.7) as regards type approval of this material or product may be considered.

2.3.12 The results of the inspections and tests are recorded in the type specimen survey report (Form PP-10.1).

2.3.13 A material/product type approval certificate (Form PP-11.1, PP-11.2, PP-11.3) is issued by the River Register in order to make sure that by results of the tests and inspections, the structure, properties, parameters and characteristics of the type material or product comply with the approved technical documentation and requirements of the Rules for the intended use on the ships and other items under technical supervision of the River Register.

The material or product type approval certificate does not replace a Certificate issued for the serial materials and products.
2.3.14 The material or product type approval certificate is valid before the expiry date of approval of technical documentation on the material or product (see 3.1.8).

2.3.15 After expiry of the material or product type approval certificate, the manufacturer shall undergo the procedure specified in 2.3.9 to 2.3.11.

When determining the scope of inspections and tests, the results of the manufacturer's survey during the procedure of recognition by the River Register, the results of technical supervision during manufacture of materials or products for the expired period as well as information on the scope and type of claims from the consumers and other persons concerned shall be considered.

2.3.16 The issued material or product type approval certificate shall expire before its validity period in the following cases:

1. Structure of the product, its properties or other characteristics are changed without approval with the River Register;
2. The requirements prescribed by the Rules as regards suitability of the material or product for further operation on the ship;
3. If approval of technical documentation as regards material or product expires.

Technical supervision during manufacture of the materials and products performed by the surveyor

2.3.17 In the cases prescribed by the Nomenclature (symbol P in column 3), technical supervision during manufacture of materials and products is performed by the River Register surveyor.

2.3.18 To receive a Certificate for materials or products, the manufacturer shall send a request to the River Register with attached technical documentation on the materials or products in the scope prescribed by the Rules (see 3.4). According to results of review of technical documentation, the requirements to the scope of inspections and tests as well as its approval shall be determined (see 3.4.8).

If documentation on the materials or products was approved earlier and has valid approval status (see 3.1.8 and 3.1.9), the request (Notice) shall include the number of the letter on approval of technical documentation (repeated approval is not required).

2.3.19 If the results of inspections and tests (see 5 to 10 of these Rules) prove the compliance of the material or product with requirements of the approved technical documentation and Rules, the surveyor shall issue certificates (Form PP-8.1).

2.4 TECHNICAL SUPERVISION PERFORMED BY THE RIVER REGISTER AND ORGANIZATION (FORM ÎÐ)

2.4.1 In the cases, prescribed by the Nomenclature (symbol OP in column 3) if performance of technical supervision by the River Register together with the manufacturer is confirmed (see 2.2.3), Form of technical supervision OP is used.

2.4.2 To use this form of technical supervision, the organization shall send a request to the River Register. When confirming use of the Form of technical supervision OP (see 2.2.3), a contract on technical supervision is concluded with the organization.

2.4.3 The Form OP is used when meeting the following conditions:

1. Use of this form is confirmed by a record in the Recognition Certificate at recognition of the manufacturer (see 2.2.3);
2. The manufacturer has a Recognition Certificate confirming the ability of the organization to manufacture the declared products (see 2.8.11);
3. The manufacturer has a Type Approval Certificate issued for the manufactured products, if it is prescribed by the Nomenclature (see 2.3.13);
4. Technical documentation on the basis of which the materials and products are manufactured, has valid approval with the River Register (see 3.1.8, 3.1.9);
5. The manufacturer assigned a person/persons authorized to control compliance with the requirements of the Rules, terms of the agreement and drawing up documentation
submitted to the River Register (hereinafter the authorized person).

.6 An agreement on technical supervision during manufacture of materials or products is concluded between the River Register and manufacturer.

2.4.4 The manufacturer's authorized person controls compliance of the structures, properties, parameters and characteristics of the materials or products which are covered by the agreement, technical documentation approved by the River Register and requirements of the Rules.

Upon satisfactory results of control the authorized person sends a request on compliance to the River Register, the form of which is determined by the River Register and attaching the acceptance/check test reports.

2.4.5 Upon satisfactory results of review of the request on compliance and attached test results or other documents confirming compliance of the materials or products with the approved technical documentation and Rules, the River Register surveyor shall issue a Certificate (Form ÐÐ-8.1) or another type of the document for this type of the products if it is prescribed by the Rules.

2.5 TECHNICAL SUPERVISION IN THE FORM OF A TYPE APPROVAL (FORM ÎÒ)

2.5.1 In the cases specified in the Nomenclature (symbol ÎÒ in column 3), the Form of technical supervision ÎÒ is used during manufacture of the materials and products.

2.5.2 Technical supervision according to the Form ÎÒ includes performing the procedure of approval of the material or product type without further supervision of their manufacture.

2.5.3 The Form OP is used when meeting the following conditions:

.1 The manufacturer has a valid Recognition Certificate at the moment of material or product manufacture confirming ability of this organization to manufacture these products (see 2.8.11);

.2 The manufacturer has a Type Approval Certificate issued for the manufactured products and valid at the moment of material or product manufacture (see 2.3.13).

2.5.4 In order to confirm compliance of the welding consumables and their quality with the approved technical documentation as well as to confirm the possibility of using the Form OT, tests of these welding consumables are performed annually in the presence of the surveyor.

At annual tests of the welding consumables, the type approval tests shall be performed for the respective welding consumables, except for the tests for determination of the cold-cracking resistance and the sea water corrosion resistance of the weld metal and the welded joint.

A mark on the performed test shall be put on the back of the welding consumable approval certificate (Form PP-11.3).

2.5.5 Technical supervision according to the Form OT shall not be performed if the conditions specified in 2.5.3 and 2.5.4 are not met.

2.6 TECHNICAL SUPERVISION IN THE FORM OF RECOGNIZED DOCUMENTATION (FORM ÏÄ)

2.6.1 Technical supervision in the form of recognized documentation during manufacture of materials and products is used in the cases specified in the Nomenclature (symbol ÏÄ in column 3).

2.6.2 Quality control of the products according to the Form ÏÄ is performed by the manufacturer's quality control departments according to the approved technical documentation.

2.6.3 The Form OP is used when meeting the following conditions:

.1 Technical documentation on the materials or products has valid approval with the River Register (see 3 of these Rules);

.2 Materials and products comply with the approved River Register documentation.
2.6.4 In case of non-compliance of the materials and products with the approved documentation, the River Register does not allow to use them on the ships regardless of availability of the documents issued by the manufacturer.

2.7 TECHNICAL SUPERVISION PERFORMED BY ANOTHER CLASSIFICATION ORGANIZATION ON BEHALF OF THE RIVER REGISTER OR BY THE RIVER REGISTER ON BEHALF OF ANOTHER CLASSIFICATION ORGANIZATION

2.7.1 Technical supervision performed by another classification organization authorized for classification and survey of ships according to the laws of the Russian Federation, on behalf of the River Register or by the River Register on behalf of another classification organization is performed under an agreement on mutual substitution and/or according to a specific assignment.

2.7.2 The following shall be determined in the agreement on mutual substitution and/or assignment:

- items and scope of tests;
- applicable requirements of the Rules;
- procedure for technical documentation approval;
- issued documents;
- payment procedure for the work carried out within technical supervision.

2.7.3 During technical supervision performed by another classification organization on behalf of the River Register or by the River Register on behalf of another classification organization, certificates or other documents of the organization which performed technical supervision are issued for the items under technical supervision.

Unless otherwise specified in the agreement and/or assignment, certificates or other documents issued by the classification organization performing technical supervision on behalf of another classification organization, shall have the following mark:

On behalf _________________________
(name of the classification organization)
No._____ dated __________ 20____.

2.7.4 Unless otherwise specified in the agreement and/or assignment, the tests during technical supervision shall be performed using the methods and according to the River Register Rules.

2.7.5 Assignment on technical supervision from another classification organization is accepted by the Head Office. The Branch Offices carry out work on behalf of another classification organization only in case of the Head Office’s written instruction.

2.8 RECOGNITION OF ORGANIZATIONS

2.8.1 The River Register recognizes the organizations carrying out the following types of activities:

- construction, conversion, modernization and repair of ships;
- manufacture of materials and/or products to be installed on the ships;
- repair of products;
- design of ships;
- tests prescribed by the Rules;
- fault detection of the ship components and machinery;
- underwater inspections;
- diagnostics, tests and maintenance of ship machinery;
- test and inspection of life-saving appliances, maintenance of inflatable life-saving appliances;
- maintenance of communication and navigation equipment;
- inspection of metal structures of hoisting gear;
- installation and adjustment operations.

2.8.2 The conditions of the organization recognition by the River Register generally include the following:

- compliance of the test results performed according to the test program approved by the River Register with the Rules (for the types of activities specified in 2.8.1.1 to 2.8.1.3, 2.8.1.5, 2.8.1.6)
.2 availability of the resources in the organization to manufacture products, carry out works, render services complying with the Rules, as well as used methods for product quality control:

own or leased production areas (except for the cases when the works can be carried out without own or leased areas);

workers who are qualified for the works and tests prescribed by the Rules and/or approved technical documentation, production process (e.g., ultrasonic control and penetrant test specialists);

equipment (machines, bench equipment, welding equipment, test equipment, etc.) used by the organization to carry out the declared works as well as instruments;

approved technical documentation and production processes (see 3.1.10);

.3 provision by the organization with the used production procedure, carrying out of the works or tests and internal control systems to provide appropriate level and stability of product quality, carrying out of the works and tests;

.4 provision of reliable results of the inspections and tests by the organization by certification of test equipment, testing and calibration of instruments;

.5 for the organizations assigning some of the production, design processes or tests to the concerned organizations (contract) — availability of documents which allow to provide monitoring and control of the assigned processes by the concerned organization (organizations) (contractors).

The clarified conditions for recognition of types of activities specified in 2.8.1, are determined in 2.8.3 to 2.8.7.

2.8.3 The organization engaged in activity specified in 2.8.1 shall submit the following establishing and registration documents according to national law of the country where the organization is registered:

for legal entities:

constitutive documents (charter, articles of association or provision, decision on assigning sole/another executive body);

a document (Certificate) confirming the fact of making an entry on the legal entity in the Unified State Register of Legal Entities (for organizations outside the Russian Federation — document confirming its registration as a legal entity of the respective state);

a certificate on registering the organization in a taxation body (for the organizations registered on the territory of the Russian Federation);

for individual entrepreneurs:

a document (Certificate) confirming the fact of making an entry on the individual entrepreneur in the Unified State Register of Individual Entrepreneurs (for an individual entrepreneur outside the Russian Federation — document confirming its registration as an individual entrepreneur of the respective state);

a certificate on registering the individual entrepreneur in a taxation body (for the individual entrepreneurs registered on the territory of the Russian Federation).

2.8.4 The following requirements additional to 2.8.2.2 are established for the organization constructing and repairing the ships (see 2.8.1.1):

.1 availability of own or leased lifting facilities or equipment in the organization;

.2 availability of welders with a Welder Approval Test Certificate (see 2.9);

.3 availability of internal quality system in the organization for the carried out works including incoming inspection, functional inspection, outgoing inspection, periodic verification and/or calibration of instruments;

.4 availability of the approved production processes for the works required by the Rules.

2.8.5 In addition to 2.8.2.2, the following requirements are established for the organization manufacturing materials and products to be installed on board the ships (see 2.8.1.2):

.1 availability of welders with a Welder Approval Test Certificate (if the requirements to welding the structures and items are prescribed by the Rules);

.2 availability of approved technical documentation with the help of which the materials and products are manufactured.
2.8.6 The following requirements additional to 2.8.2.2 are established for the specialized area (station) performing maintenance, inspection and tests of inflatable and personal life-saving appliances (see 2.8.1.9):

1. availability of the document of the inflatable life-saving appliance manufacturer confirming the possibility to carry out these works according to its requirements (for inflatable life-saving appliances);
2. availability of a closed, heated, ventilated and lighted room, the area and height of which provide the possibility of capsizing of the largest inflated rafts (or other efficient means for bottom inspection without raft capsizing shall be provided) and/or a room of the required height with a concrete floor for life-buoy tests. Temperature and moisture shall be controlled in the room;
3. availability of a room for maintenance of the inflatable life-saving appliances equipped with:
   - means and devices for maintenance of the life-saving appliances and release mechanisms according to the manufacturer's requirements to maintenance, inspections and tests of the inflatable life-saving appliances, including their gas inflation systems;
   - materials and components for repair of the inflatable life-saving appliances, the quantity and quality of which shall be approved by the manufacturers.
   The room for inspection and test of personal life-saving appliances shall be equipped with:
   - a pool for flotation test. Water to test the life-saving appliances shall be fresh and shall arrive from a drinking water pipeline or shall be preliminary purified from suspended articles and oil products;
   - a facility for strength tests;
   - a set of calibrated loads of different weights when providing all the loading diagrams during the life-saving appliance tests;
   - a compressor or an air pump for leakage tests;
   - calipers and instruments to check the shape and linear dimensions of the life-saving appliances;
   - pressure gauges and thermometers.

Places for separate storage of different types of life-saving appliances to be inspected, tested, repaired or delivered, shall be provided. Storage conditions shall comply with the manufacturer's requirements;

4. availability of qualified personnel with the manufacturer's documents enabling to carry out works on maintenance and repair (for inflatable life-saving appliances);
5. availability of a set of technical documentation required for maintenance, inspection and test of life-saving appliances.

2.8.7 Competency of the organization Branch Offices performing the tests prescribed by the Rules during construction, conversion, modernization and repair of the ships, manufacture of the materials and products, repair of the products (see 2.8.1.5) is checked during survey of these organizations.

Competency of legally independent testing laboratories performing the tests prescribed by the Rules (see 2.8.1.5) is checked during their survey.

2.8.8 In order to receive a Recognition Certificate the organization sends a request to the River Register attaching reports with information (data) on compliance of the organization with the recognition conditions (see 2.8.2 to 2.8.7).

In case of detecting non-compliance of the organization with the recognition conditions at review of the submitted request and its attached information (see 2.8.2), the River Register refuses to perform survey of the organization by sending motivated causes of refusal in writing.

2.8.9 According to results of review of the request and its attached information in case of establishing their compliance with 2.8.2 to 2.8.7, the surveyor performs survey of the organization to evaluate its ability to carry out works/render services or manufacture products according to the requirements of the Rules, compliance of the organization with the recognition conditions specified in 2.8.2 to 2.8.6 as well as checking the data specified in the request and its attached information.
If the organization claiming to receive a Recognition Certificate assigns operations of the production process approved by the River Register (see 3.1.10) or tests prescribed by the Rules to other organizations (contractors), the River Register takes a decision on contractor survey. Contractor survey is performed by the organization claiming to receive a Recognition Certificate.

2.8.10 During survey of the testing laboratories (organization Branch Offices performing tests prescribed by the Rules during construction, conversion, modernization and repair of the ships, manufacture of the materials and products, repair of the products), possibility of performing the test methods prescribed by the Rules is checked using the check tests performed in the presence of the surveyor according to the program approved by the River Register.

The scope of tests is established according to the requirements of the Rules. During survey of the organization manufacturing the materials and products, the River Register considers the test results of the items under technical supervision in this organization performed during approval of type material or product in the presence of the River Register surveyor not later than two previous days before the date of the organization survey.

2.8.11 According to results of the performed organization survey the surveyor draws up a Survey Report of the organization (Form PP-10.2) where the results of the performed survey and possible forms of technical supervision are specified.

According to results of review of the request and its attached information, as well as Survey Report, the River Register shall take a decision on issuing (refusing to issue) a Recognition Certificate for the organization for those types of works/services, the performance of which was confirmed during survey. The Recognition Certificate of the testing laboratories or organizations which have Branch Offices performing the tests prescribed by the Rules, specifies the list of tests (see 2.8.1.5) for which the organization is recognized.

The Recognition Certificate is issued for those types of activities which are actually performed by the organization.

2.8.12 The period of validity of the Recognition Certificate is two years.

Upon expiry of the Recognition Certificate, the organization is subject to survey according to the procedure specified in the requirements in 2.8.8 to 2.8.11.

It is allowed not to submit the establishing and registration documents specified in 2.8.3 if they were not changed since last request submission. The report (see 2.6.8) shall include a reference to the previously submitted documents.

2.8.13 Compliance of the organization with the recognition conditions is checked in the following cases:

- violation of the requirements specified in 2.8.2 by the organization;
- amendment of technical documentation without approval with the River Register, if necessity of such an approval is established by the Rules;
- detection of inadmissible defects or violations of quality stability of the product manufactured by the organization;
- performance of works or tests with violated requirements established by the Regulations for Classification and Rules or submission of unreliable information on the results of the performed works or tests to the River Register;
- decrease of manufacturing facilities in the organization as well as other changes in the result of which performance of works by the organization for which a Recognition Certificate was issued, according to the requirements of the Rules becomes impossible;
- detection of deficiencies in the work of the organization when performing technical supervision in the organization.

Compliance with the recognition conditions is not checked for the organizations designing the ships (see 2.8.1.4). In case of repeated detection of previously detected violations which were not eliminated by the design organization during review of design documentation by the River Register, the River
Register sends a notification to the design organization on the necessity of remedial actions aimed at increase of quality of the design works with further notification of the River Register on the taken actions. The Recognition Certificate is invalidated in case of detection of the deficiencies specified in the notification which were not eliminated.

In case of detecting a ground to check compliance with the recognition conditions, the River Register notifies the organization on the performed test and its terms.

2.8.14 According to results of checking compliance of the organization with the recognition conditions, a report is drawn up, on the basis of which the River Register takes one of the following decisions:

.1 confirm validity of the Recognition Certificate;
.2 recommend remedial actions to the organization in the terms approved by the River Register on elimination of the detected deficiencies in the activity of the recognized organization and their consequences;
.3 suspend the Recognition Certificate for one or several types of activity for which the Certificate is issued, if the remedial actions specified in 2.8.14.2 were not taken within the terms approved by the River Register during the approved period for the remedial actions;
.4 cancel the Recognition Certificate for one or several types of activity for which the Certificate is issued, if the remedial actions were not taken within the terms approved by the River Register.

The River Register controls implementation of the remedial actions within the terms approved by the organization. According to results of the check, a report is drawn up which serves as a basis to suspend, confirm or cancel the Recognition Certificate.

In case of cancelling the Recognition Certificate for one or several types of activity, specified in the Certificate, the Recognition Certificate for the works, for which the Certificate was cancelled, is issued again according to the procedure specified in this section to receive the Recognition Certificate.

2.8.15 During validity of the Recognition Certificate, the organization:

notifies the River Register on any changes in its activity specified in the Recognition Certificate within 2 weeks;
provides access for the River Register to information on measures taken to provide quality, test procedures, tests, equipment, reporting documents and statistical data related to own activity specified in the Recognition Certificate.

2.8.16 The Recognition Certificate is reissued in the following cases:

.1 reorganization of the legal entity in the form of a transformation;
.2 change of the organization name or legal address, or of the individual entrepreneur name or place of residence not changing actual address where works are carried out;
.3 increase of scope of the works for which the Recognition Certificate was earlier issued;
.4 exclusion of the operations for which the Recognition Certificate was earlier issued.

2.8.17 The basis to reissue the Recognition Certificate in the cases specified in 2.8.16.1, 2.8.16.2 and 2.8.16.4 is a written request of the organization with the Certificate attaching copies of the documents which confirm the specified changes as well as the original valid Recognition Certificate.

The basis for reissue of the Recognition Certificate in the case specified in 2.8.16.3 is the procedure of the organization recognition according to 2.8.8 to 2.8.11.

A new number is assigned to the reissued Recognition Certificate. Validity period of the reissued Recognition Certificate starts from the date of its signing and is not extended.

2.9 WELDER APPROVAL

2.9.1 The conditions of receiving the Welder (Operator) Approval Test Certificate for the following works are given in this chapter:

.1 welding of hulls;
.2 welding of ship's pipelines;
.3 welding of ship boilers and pressure vessels;
.4 welding of defects in forgings and castings.

2.9.2 To receive the Welder Approval Test Certificate the welder shall pass tests which include checking of his theoretical and practical knowledge. Approval tests shall be performed according to the procedure specified in Appendix 7.

The approval test of a welder may be combined with the qualification tests at the place of the welder’s work or training.

2.9.3 A request to receive the Welder Approval Test Certificate shall include the following data: full name, year of birth, place of work, date and place of certification issue. A copy of the welder’s certification, a report on work experience as a welder, copies of certificates on welding consumables and base materials of the samples which shall be used for operational tests are attached to the request.

2.9.4 Materials for manufacture of the samples shall be approved by the River Register and have relevant certificates.

Test assemblies shall be welded using welding consumables and procedures approved by the River Register.

2.9.5 If malfunctions of equipment (voltage drop, de-energising etc.), peeling of an electrode coat or other defects not depending on the welder, occur during the welding of test assemblies, the same number of test assemblies shall be re-prepared.

2.9.6 A protocol shall be drawn up on the basis of the test results. The protocol shall be signed by the surveyor who participated in the tests.

2.9.7 Upon satisfactory results of the tests the River Register issues a Welder Approval Test Certificate (Form PP-1.23), confirming welders’ approval for welding operations specified in 2.9.1 with the determined conditions (material, welding method, welding position).

The validity period of the welder approval certificate is two years.

2.9.8 The Certificate becomes invalid in the following cases:
.1 if during validity of the Certificate the welder did not perform welding operations on the items under technical supervision of the River Register specified in the Welder Approval Test Certificate for more than six months in a row;
.2 if during technical supervision (record in the Notice) the River Register determined that more than 10% of the welds performed by the welder do not meet the requirements of the Rules.

2.9.9 Confirmation of the works performed by the welder and specified in the Certificate shall be a record on the back of the Certificate by the welder’s senior or authorized employee of the employer confirming that the welder performed the works specified in the Certificate according to the requirements of the Rules during the last six months from the date of the last record or Certificate issue. This record is made every six months.

2.9.10 To receive a new Certificate, the welder shall pass the approval tests according to 2.9.2 to 2.9.7.
3 REVIEW AND APPROVAL OF TECHNICAL DOCUMENTATION

3.1 GENERAL

3.1.1 Technical documentation on construction, conversion, modernization and repair of the ships, manufacture of the materials and products, repair of the products as well as software applications used for designing are approved by the River Register to check compliance with the requirements of the Rules.

3.1.2 Technical documentation shall be submitted to the Head Office (see 1.3) or Branch Office (see 1.4) in the geographical boundaries of which the design organization operates. Technical documentation shall be submitted in the form of originals or copies signed (confirmed) by the organization which is the developer of technical documentation.

3.1.3 If documentation has engineering solutions providing the same level of safety which would be provided by compliance with the requirements of the Rules (equivalents), the organization developing technical documentation submits a list of these solutions with their contents and technical justification to the River Register.

3.1.4 Documentation shall be submitted for review in the scope which allows to ensure that the requirements of the Rules are met. For the standard list of technical documentation submitted for review to the River Register, see Appendix 8.

3.1.5 The design organization upon agreement with the River Register may select one of the following ways of technical documentation submission to the River Register for approval:

.1 in two stages: first, documentation in scope of technical design and then detailed documentation shall be submitted;
.2 in one stage: technical documentation shall be submitted in the scope which includes all the required data, provides the possibility to determine compliance of the designed ship or products with the requirements of the Rules and provides technical supervision during manufacture of the main structural assemblies (detailed design).

3.1.6 Documentation shall be submitted for review in two copies. One copy - in paper media, second copy - in electronic media (hereinafter the River Register copy) attaching paper design document list drawn up according to 3.1.7.1.

Detailed documentation (see 3.3) shall be submitted for review in one copy.

3.1.7 The following requirements shall be applied to the submitted documents:
.1 documents in paper media shall:
  have the required signatures (at least of the developer and approver);
  be made in a legible manner;
  be free of erasures, postscripts, crossed out words and other corrections which were not specified;
  be free of damages, the presence of which does not allow ambiguous interpretation of the document contents;
.2 documents in paper media shall:
  be in PDF (PDF/A);
  have built-in fonts used during designing;
  have a separate page for each drawing;
  have the drawing name or its name in the list of documents in the file names.
3.1.8 The period of validity of approval of technical documentation and software applications is six years. Upon expiry of this period or if the interval between the dates of approval of technical documentation and start of ship construction, manufacture of the materials and/or products exceeds three years, technical documentation shall be subject to re-approval in order to consider the changes in the Rules entered during the specified period.

Approval of technical documentation for repair, conversion or modernization of the ships as well as for repair of the products is performed without time limitation.

3.1.9 Validity of approval of technical documentation shall expire in the following cases:

.1 if the interval between the dates of approval of technical documentation and start of the ship construction, manufacture of the materials and/or products exceeds three years;
.2 amendment of the requirements prescribed by the Rules with respect to the ships, materials and products to be installed on the ships;
.3 amendment of the previously approved technical documentation without approval by the River Register.

3.1.10 Production processes of construction and repair of the ships, manufacture of the materials and products shall be subject to approval by the River Register if the Rules establish the requirements with respect to process operations or production processes.

3.1.11 The production process shall specify the following: a list of operations, equipment, materials (in the cases prescribed by the Rules), control/test methods, instruments and correction methods (in the cases prescribed by the Rules).

The production process of assembly and welding of the ship structures and hull shall include the following:

.1 description of the welding techniques and characteristics of the used welding equipment, production accessories and welding consumables during construction or repair of the hull;
.2 block and section plans of construction or repair of the hull;
.3 principal assembly and welding procedure of the type panels, two- and three-dimensional sections and blocks as well as hulls on slipway specifying the sequence of assembly-welding works, welding methods and conditions;
.4 guidelines for welding procedures.

3.1.12 Approval of technical documentation by the River Register shall be drawn up by stamping the drawings or documents with numbers and dates of a conclusion letter.

The stamp samples shall be approved by the Head Office.

3.1.13 Approval of technical documentation by the River Register structural unit shall be valid for all River Register Branch Offices. This approval can be cancelled or changed only by the Branch Office which approved the specified technical documentation or by the higher (as to subordination) River Register Branch Office.

Technical documentation approved by one of the River Register Branch Offices shall be accepted by other Branch Offices for technical supervision without additional approval if by conditions of works during technical supervision of the River Register in a specific organization, correction or entering changes in the specified technical documentation is not required.

3.1.14 Changes entered by the developers in technical documentation previously approved by the River Register shall be approved by the River Register structural unit which reviewed technical documentation except for the cases specified in 3.1.13.

3.1.15 Changes entered in technical documentation during construction, conversion, modernization and repair of the ship, manufacture, repair of the product or manufacture of the material in the production process, shall be approved by the River Register Branch Office which approved the specified documentation or Branch Office which performed technical supervision. The Branch
Office which performs technical supervision may submit critical decisions for review and approval to the River Register Branch Office which approved the specified documentation.

The changes approved only for a specific item, do not apply to the next items without preliminary review and approval by the River Register.

Permission to deviate from technical design, detailed documentation, technical documentation on the materials or products, production process, shall be drawn up with a permission map for deviation (Appendix 9) with a reference to the Branch Office letter or approved document of the River Register.

3.1.16 During review of technical documentation, the River Register does not check correctness of computing operations used during calculations, including programs approved by the River Register. The River Register reviews the end results of calculations. The calculations shall be made according to the guidelines of the Rules or methods approved by the River Register.

In specific cases the River Register additionally examines reliability of the end results of calculations.

3.2 TECHNICAL DESIGNS OF THE SHIPS

3.2.1 Technical designs of the ships shall be submitted for review by the Head Office or Branch Office with an accompanying letter and a full list of documents submitted for review.

3.2.2 Designs can be submitted in separate parts (hull, machinery and electrical) upon agreement with the River Register. The first part of the documentation shall be submitted with the specification and general arrangement plans.

If according to the results of reviewing other parts of documentation remarks requiring corrections of the previously approved part are made, this part shall be corrected and approved by the River Register.

3.2.3 For the new types of ships, for which the requirements are not available or not fully covered in the Rules, the River Register may request additional documents and data as deemed necessary by the River Register.

3.2.4 The time for review of technical designs submitted for review in the scope prescribed by the Rules shall not exceed 30 working days.

3.2.5 For each reviewed design or entered changes the River Register shall draw up a written opinion.

If the River Register refuses to approve the design, the Register shall specify the grounds of refusal and its remarks in the reporting letter.

The reporting letter on design approval shall specify ship class, navigation area and freeboard depth as well as the list of approved documents and stamps on them. If required, restrictions on wind and wave conditions, type of carried cargo, etc. shall be specified. Then remarks (if any) subject to elimination during correction of the design or during development of the working drawings shall be specified.

The list of approved documents and stamps on them shall be specified in the reporting letter on approval of changes or additions entered in the documentation of the technical design approved by the River Register.

3.2.6 Approval of technical designs by the River Register submitted in paper media shall be drawn up by stamping the drawings or documents (see 3.1.12).

3.2.7 The River Register shall send the set of approved technical designs in paper media with the conclusion to the developer.

3.2.8 Technical designs on construction of a ship with expired approval (see 3.1.8, 3.1.9.1) shall be subject to correction in order to consider the changes in the Rules entered since design approval. The design submitted for review shall include an explanatory note with analysis of the design compliance with the Rules (changes) introduced after previous review of the design. In case of design non-compliance with the requirements of the Rules, the grounds of practicability on bring-
3 Review and Approval of Technical Documentation

3.2.9 The procedure of review and approval of technical designs shall be also applied to technical documentation submitted to the River Register in one stage.

3.2.10 The Head Office reviews the designs approved by the Branch Office by the way of control. In this case at request of the Head Office, the Branch Office sends a copy of the approved design for check review, after which the design together with the conclusion is returned to the Branch Office by the Head Office. The Branch Office shall inform the design organization on the Head Office conclusion in case of remarks and provide control over elimination of the remarks.

3.3 DETAILED DOCUMENTATION

3.3.1 The conditions of the detailed documentation review (place, time, procedure and method of document preparation) shall be determined by the design organization upon agreement with the Branch Office.

3.3.2 Detailed documentation is prepared according to the technical design approved by the River Register considering the requirements of the Rules and national standards, if their use is mandatory according to the Rules.

3.3.3 Approval of the detailed documentation and changes entered in the specified documentation shall be drawn up in the form of a reporting letter. The approved detailed documentation shall be stamped (see 3.1.12). The stamp on approval shall be put on the first page of the document after elimination of all the remarks of the Branch Office.

3.3.4 The designer signs all the copies of the detailed documentation approved by the Branch Office.

3.3.5 After repeated approval of the technical design (see 3.2.8, 3.3.7), the detailed documentation shall be corrected.

The detailed documentation issued under a new number shall be approved by putting a stamp on it and the corrected documentation with the same number shall be approved by putting a stamp on the notice on change.

3.3.7 After approval of the detailed documentation, newly developed or corrected by results of re-approval of the technical design, the developer shall issue a list of materials of the detailed design approved by the Branch Office. Marks on the date of approval of each document shall be put on the list.

3.3.8 Anonymized documentation developed according to national standards is subject to approval by the Branch Office as part of the detailed documentation.

3.4 TECHNICAL DOCUMENTATION ON THE MATERIALS AND PRODUCTS

3.4.1 The River Register reviews and approves technical documentation on manufacture of the products and materials, repair of the products included in the Nomenclature. If the designer (developer of technical documentation) takes decisions in the technical documentation submitted for review and these decisions do not comply with separate requirements of the Rules, then grounds confirming that the taken decisions are of same efficiency as the decisions prescribed by the Rules from the point of view of safety shall be submitted for review by the River Register as part of technical documentation.

3.4.2 Technical documentation on manufacture of the products shall be submitted for review by the River Register according to 3.1.6.

For the standard list of the submitted documentation, see Section 5 of Appendix 8. Technical conditions or documents replacing
them (hereinafter technical conditions) shall include the following:

- description of the product characteristics;
- requirements of environmental protection;
- acceptance rules;
- operating instructions.

The "Description of the product characteristics" section includes the main parameters and characteristics (properties) of the product, scope of application, requirements to the materials, completeness and marking.

The "Requirements of environmental protection" section includes the requirements on product recycling.

The "Acceptance rules" section includes the product control procedure by the manufacturer's quality control departments and the scope of the submitted batches.

The "Operating instructions" section includes instructions on product installation at place of its operation/use and operating conditions, if such requirements are prescribed by the Rules as well as the parameters and characteristics of the product subject to operation inspection established by the manufacturer.

The submitted test program specifies the test procedure, the necessity of which is prescribed by the Rules, as well as test conditions and instruments.

3.4.3 If the materials and products (their parts) for the ships are designed and manufactured according to the requirements of national standards (see 2.1.5), then the documents subject to approval are the documents specified in Appendix 8: calculations, general arrangement drawings and drawings of critical parts, assembly drawings, schematic diagrams, test programs, etc.

3.4.4 Technical documentation on the assemblies or units, which include the components specified in the Nomenclature and delivered by the contractors (generators, reduction gears, prime movers of generators, compressors, pumps, deck machinery, automation systems, etc.) shall be approved after approval of technical documentation on the components.

The River Register approves technical documentation on the assembled product in case of availability of non-approved technical documentation on the materials and components, if the results of the functional, mechanical and climatic tests of these components as part of the assembled products and their electromagnetic compatibility tests (for electrical equipment) are recognized by the respective requirements of the Rules.

3.4.5 If the products are not developed as standard products, and they are developed for a specific ship, technical documentation on them is reviewed by the River Register as part of the ship's technical documentation.

3.4.6 Technical documentation on manufacture of the materials shall include data on the method of manufacture, chemical composition, mechanical and technological properties, scope and procedure of control and acceptance, drawing up the test results and marking procedure.

Test types, methods of control and rules of acceptance are established according to Part X of RCCS.

The test program shall be submitted together with technical documentation.

3.4.7 Review of technical documentation submitted in the scope prescribed by the Rules for one type of material or product shall not exceed 15 working days.

3.4.8 According to results of reviewing technical documentation (changes in the previously approved technical documentation) on the materials or products the River Register draws up a reporting letter. The reporting letter on approval of technical documentation or changes in the documentation includes a list of approved documents and stamps put on them (3.1.12).

3.4.9 The River Register shall send the set of approved technical documentation in paper media with the reporting letter to the developer.

3.5 SOFTWARE APPLICATIONS

3.5.1 Software application in this chapter means a set of connected program, graph and
text modules intended for solving the set calculation task using a computer.

3.5.2 Software applications intended for calculations according to the requirements of the Rules shall be subject to approval by the River Register.

The River Register takes into consideration software products used to ease computation, the possibilities of which are limited by calculation techniques or an application used to determine auxiliary values when developing technical documentation without approval.

3.5.3 In order to receive the software application approval certificate, the following materials shall be submitted to the River Register:

1. distribution disk or application demo;
2. user manual which includes requirements to computer configuration, information on the authors, description of input and output forms;
3. detailed description of the calculation methods implemented in the application with submission of all the used equations, their applications, specifying empirical coefficients, methods of solving computational tasks and in justified cases — convergence criteria, restrictions on scope of application, etc.;
   This description shall include correspondence analysis of the calculation method implemented in the application as well as accepted assumptions to the requirements of the Rules and references to literary sources;
4. test/check examples of calculations with a complete list of source data and explanation of features of their selection, all output forms and interpretation of calculation results.

Reliability of calculations made using the specified application may be checked by making calculations on initial data of the test task issued by the River Register and further comparison of summary data with the calculation results made using a reference application or results of full-scale and/or model experiments.

Test examples shall cover the whole range of possible use of the main parameters.

Information on recognition of this application by other classification societies or other competent organizations may be also submitted to the River Register. In these cases upon agreement with the River Register, the scope of the submitted materials may be reduced.

If the application considers the requirements of the Rules, it is necessary to mention this circumstance and provide a reference to the year of publication of the Rules.

Documentation shall have a number, name and shall be registered according to the established procedure.

3.5.4 Upon satisfactory results of review and check of the submitted application according to the requirements of these Rules, the River Register shall issue a software application approval certificate (Form PP-8.4).

3.5.5 If calculations included in technical documentation and made using software application with an approval certificate are submitted to the River Register, a reference to the number of Certificate issued by the River Register shall be given in the respective place.

3.5.6 If changes affecting approval are entered in the program modules of the application by its developer, the software application approval certificate may be cancelled by the River Register irrespective of its validity.
4.1 GENERAL REQUIREMENTS

4.1.1 The procedure of check tests of the items under technical supervision, types of inspections and tests are specified in the List (see 2.3.1).

4.1.2 Prior to installation of the engines and other technical facilities, devices, systems, equipment and supply the surveyor checks if the specified items have documents specified in 2.2.6.

4.1.3 Upon completion of hull works, installation of the engines and other technical facilities, devices, systems, equipment and supply the surveyor performs technical supervision during mooring and running trials per program developed according to the requirements of the Rules and design documentation of the ship approved by the River Register.

4.1.4 The program of mooring and running trials considers the requirements of technical documentation on the products as well as manufacturer's test programs for the products installed on the ship.

In case there are test methods approved by the River Register, the program of mooring and running trials shall include references to these methods.

4.1.5 The program of mooring and test trials shall be approved by the same Branch Office of the River Register which reviewed the materials of technical design.

4.1.6 The program of mooring and running trials includes the following sections:

- preparation for trials;
- mooring trials;
- running trials;
- inspection;
- check sailing, check trials.

The surveyor participates in ship trials at all trial stages. During preparation for trials the surveyor checks the complete set of construction documents (manufacturer's acceptance certificates, test reports, construction book, quality control department's documents, etc.) and operating documents on the components.

4.1.7 Equipment control during trials is performed according to operating rules and operating manual.

4.1.8 The surveyor is not allowed to control equipment on his own or to interfere with the actions of the acceptance board (trial crew) assigned for trials. If the personnel's actions may lead to an emergency or damage of equipment, the surveyor may request to stop such actions through the representatives of the quality control department and person responsible for trials (responsible inspector).

4.1.9 During trials of the items under technical supervision all the works which interfere with trials or create a risk for the participants of the trials shall be stopped, the production areas near the item of trial shall be freed from foreign objects, lighting and ventilation shall be provided.

4.1.10 Mooring and running trials shall be performed according to the schedule approved by the surveyor.

4.1.11 If the trial results of the items under technical supervision do not comply with the
requirements of the Rules or approved documentation, they shall be subject to repeated trials after elimination of the causes which led to unsatisfactory results.

The methods of elimination of the defects and the scope of repeated trials shall be approved by the surveyor.

4.1.12 The possibility of interruption of the item trials in the modes which require continuous operation shall be considered in the test program and the matter of continuing the trials and their conditions (increase of length and scope) shall be approved by the surveyor considering the causes which led to stop of the trials.

4.1.13 During repeated forced interruption of one of the modes of continuous operation, the trials shall be stopped until elimination of the causes which led to interruption with further repeating of trials in full scope. Time of the trials shall be approved by the surveyor.

4.1.14 The trials of the items shall be interrupted in the following cases:

1. in case of detection of faults or defects, elimination of which requires longer interruption than that specified in the program;
2. in case of emergency state of the item;
3. in case of deterioration of weather conditions which pose a threat to safety of the ship.

4.1.15 The decision on trial termination depending on the causes, requiring to stop the trials shall be taken by the ship constructor or customer. When detecting the cases specified in 4.1.14 the surveyor may request the person responsible for trials (responsible inspector) to stop the trials.

Irrespective of the person taking the decision to stop the trials, the item under technical supervision shall be subject to repeated trials, the length and scope of which shall be approved by the surveyor.

4.1.16 During termination of the item trials, a report shall be prepared specifying the causes of terminating the trials as well as requirements and measures on their elimination subject to performance before repeated trials.

4.1.17 Upon completion of the trials, an acceptance certificate with protocols and tables of acceptance tests shall be submitted to the surveyor for signing.

4.1.18 In case of ship construction in two or more shipbuilding organizations, the River Register documents shall be prepared by the surveyor who performed technical supervision during outfitting and trials of the ship.

The surveyor who performed technical supervision at initial stages of ship construction shall prepare a report on the carried out works with the list of the carried out works as per the List (see 2.3.5) and shall send it together with the certificates on the products, datasheets and files on the installed equipment to the Branch Office performing technical supervision during outfitting of the ship. The report shall include the required information to fill in the Certificates of seaworthiness and other documents of the River Register. It is not allowed to use the River Register forms to prepare a report.

4.1.19 Upon completion of the ship construction, availability of the fixed marking nameplates including the following information shall be checked:

1. name, location and identification of the ship constructor;
2. serial/hull number;
3. year of ship construction;
4. type of ship and its main parameters;
5. project number (code);
6. tonnage or passenger capacity;
7. maximum capacity of main engines (for self-propelled ships);
8. maximum speed (for self-propelled ships).

4.2 MOORING TRIALS

4.2.1 Mooring trials are performed to check the following:

1. quality of the carried out hull works, location, complete set and quality of installation, adjustment and serviceability of the engines, devices, systems, equipment and supply as well as compliance of their parameters with
the requirements of the Rules and approved technical documentation;

.2 readiness of the ship, its main and auxiliary engines, devices, equipment and supply for running trials.

4.2.2 Prior to start of mooring trials, the following shall be submitted to the surveyor:

.1 documents certifying completion of installation and other works;
.2 mooring trial program;
.3 mooring trial plan subject to approval by the surveyor;
.4 specification;
.5 list of replacements equivalent to the requirements of the Rules (see 3.1.3), a permission map to deviate (see 3.1.15);
.6 files and datasheets on ship machinery;
.7 documents for devices;
.8 description of items under technical supervision and maintenance instructions;
.9 test procedures (including simulation with diagrams of simulators).

4.2.3 The date and time of mooring trials shall be determined by the ship constructor as approved by the surveyor.

4.2.4 Machinery, devices, equipment and systems which do not require running modes shall be checked and tested during mooring trials.

4.3 RUNNING TRIALS

4.3.1 Running trials shall be performed for the following:

.1 to check the main parameters of the main engines and power plant as well as their compliance with the specifications;
.2 to check operation of the power plant at maneuvering at ahead and astern running;
.3 to check reversing properties of the main engines;
.4 to check serviceability of the main engines and power plant under conditions close to operating conditions;
.5 to check characteristics of manoeuvrability and controllability of the ship;
.6 to check automation equipment under conditions close to operating conditions;
.7 final check of the items except those which shall be subject to inspection and further check tests;
.8 to check serviceability of deck machinery, devices, apparatuses, navigation, radio- and electrical equipment under conditions close to operating conditions;
.9 to measure torsional vibration parameters of the system (engine - shafting - propeller) and vibration parameters of hull structures and technical facilities;
.10 to confirm the possibility of assigning the River Register class to the ship prescribed by the project according to its purpose.

4.3.2 Prior to start of running trials, the following shall be submitted to the surveyor:

.1 quality control department's documents certifying completion of mooring trials;
.2 running trial program approved by the River Register;
.3 running trial plan approved by the surveyor;
.4 trial procedures;
.5 information on the ship stability and floodability;
.6 heeling test report and stability calculations (for the lead ship);
.7 documents specified in 4.2.2.4, 4.2.2.5, 4.2.2.7 and 4.2.2.8.

4.3.3 After submission of the documents specified in 4.3.2 to the surveyor, as well as upon completion of mooring trials and elimination of the detected defects, a notice specifying the assigned date of running trials shall be sent to the surveyor.

The notice shall specify readiness of the ship for running trials and information on the quantity of participants of the trials, availability of collective and personal life-saving appliances and ship stores.

4.3.4 Upon satisfactory results of mooring trials, the surveyor shall confirm the possibility of ship sailing for running trials in writing.

4.3.6 The area of running trials and restrictions on weather conditions shall be approved by the surveyor for compliance with the conditions prescribed by the requirements of the
Rules and approved technical documentation. The area of running trials shall be safe, suitable for performance of the test program in full and to obtain reliable test results.

4.3.7 During running trials, operation of all the technical facilities, devices, systems and equipment shall be checked. The detected defects shall be eliminated and repeated trials shall be performed, if necessary.

4.3.8 The test results shall be recorded in the protocols and books specifying the values of the controlled parameters required to evaluate proper operation of technical facilities, devices, systems and other equipment.

4.3.9 Upon completion of running trials, the surveyor shall submit all the remarks detected during running trials to the organization in writing.

4.4 INSPECTION AND CHECK SAILING

4.4.1 Upon completion of running trials or trials in running mode without ship motion using simulation, elimination of remarks and meeting the surveyor's requirements (see 4.3.9), the organization together with the surveyor shall prepare a list of items subject to inspection specifying the scope of works. The list shall be prepared considering the results of mooring and running trials as well as technical supervision of same type items.

4.4.2 During inspection, separate assemblies of the items under technical supervision shall be dismantled to determine their condition and necessity of check tests after inspection.

4.4.3 The inspection results shall be drawn up with a report with the following information:

1 a list of the items under technical supervision subject to inspection;
2 description of detected defects;
3 causes of defects;
4 a list of measures to eliminate the defects.

The surveyor shall sign the report only for the items under technical supervision of the River Register.

4.4.4 Prior to check sailing all the defects detected during mooring and running trials and detected violations of the Rules shall be eliminated.

4.4.5 Necessity of check sailing shall be approved by the surveyor. Check sailing is required in the following cases:

1 Item under technical supervision was subject to inspection and check tests can not be performed without check sailing;
2 Parameters describing proper operation of the item under technical supervision may be confirmed only during check sailing;
3 According to results of mooring and running trials and/or inspection, complete replacement of the item or replacement of assemblies the serviceability of which was confirmed only during check sailing was required;
4 The simulation devices do not allow to obtain the required modes or if such devices are not available.

4.4.6 Satisfactory results of mooring and running trials as well as check sailing shall be the ground for drawing up the River Register documents on the constructed ship.

4.4.7 If the ship is delivered to the customer by railway or other transport, the Branch Office which performed technical supervision during construction, shall assign register number to the ship, draw up a set of the River Register documents and send it to the Branch Office's address in the area of operation of which the ship shall be operated. The report of initial survey shall specify the requirement on ship submission for occasional survey of the River Register Branch Office for registration.

The Branch Office in the area of operation of which the ship arrived, performs occasional survey with check test of the ship and its components in running mode, specifies the date of the next survey and registers the ship for classification of the Branch Office.
4.5 PECULIARITIES OF TECHNICAL SUPERVISION DURING TESTS OF PROTOTYPE SHIPS

4.5.1 Tests of the prototype ship are performed according to an extended program, compared to that of ships of a series, which includes checking the characteristics and determination of the parameters which shall be used for the ships of a series without such checks.

4.5.2 The trial program for the prototype ship include:

1. performing inclining test according to Part II of RCCS;
2. determining maneuvering capabilities;
3. measuring vibration parameters of the hull structures and separate items of ship equipment;
4. checking strength and seaworthiness at rolling (see 4.5.4);
5. measuring torsional vibration parameters of the system (engine-shafting-propeller);
6. running trials under conditions maximally close to operating conditions;
7. tests of the power plant in the scope larger than that for the ships of a series;
8. inspection in the scope larger than that for the ships of a series;
9. check sailing meeting the conditions of running trials.

4.5.3 Trials of prototype ships including pushed convoys in order to determine maneuvering capabilities as regards controllability and inertial properties shall be performed according to the procedure approved by the River Register.

4.5.4 Trials of prototype ships and ships of new structural types as well as ships with main dimension ratios outside the limits prescribed by the Rules shall be performed under design wind and wave conditions considering the following:

1. testing the ship and coupling strength with voltage measurement according to a specially developed program;
2. checking controllability at wind;
3. evaluating roll parameters;
4. general monitoring of the ship condition (wettability, operation of propellers and ship equipment at roll).

The specified tests are performed according to the program and within the terms approved by the River Register.

4.5.5 Upon completion of the prototype ship trials, the developer of the ship design shall determine the list of measures to be performed on the following ships of a series. This list shall be approved by the River Register.

4.5.6 In case of use of new materials, type specimens of products and equipment depending on the ship purpose, operational tests shall be provided according to the program approved by the River Register.

Operational test reports shall be submitted to the Branch Office within the approved terms after completion of the tests.

4.5.7 The necessity of performing operational tests shall not be an obstacle for drawing up and issue of the River Register documents for the ship.

4.6 PECULIARITIES OF TECHNICAL SUPERVISION DURING SIMULATION TESTS

4.6.1 The simulation tests shall be performed during construction of the ship series according to the procedure developed considering РД5Р.0202.

4.6.2 Expediency and methods of simulation tests shall be determined by the shipbuilding organization, designer and customer.

4.6.3 Simulation devices, methods of their fastening and their impact (vibration, etc.) shall not adversely affect the tested item or ship structures.

Adjustment of simulation devices and comparative tests shall be performed on the serial and prototype ships.

4.6.4 The requirements of this chapter do not apply to prototype ships and type specimens of items under technical supervision.
The purpose of joint simulation and full-scale tests on the prototype ships and standard items is evaluating the possibility of replacement of full-scale tests with simulation tests of the next serial items.

4.6.5 During simulation tests, all the control parameters of the tested item prescribed by the Rules shall be checked.

If simulation tests allow to determine only some of the parameters, other parameters shall be determined during full-scale tests.

4.6.6 In order to justify use of simulation methods, comparative tests (full-scale in open water and simulation) shall be performed on one ship with further analysis of their results, development and approval of operating program (procedure) of simulation tests for the ships of this series.

4.6.7 Comparative tests shall be performed according to the program (procedure) approved by the River Register.

4.6.8 The program (procedure) of comparative tests includes the following:

.1 explanatory part which includes theoretical justification of the accepted simulation method of tests, diagrams (drawings) of simulation devices and their connections with the tested items, diagrams of training courses, information on quantity of the ships on which comparative tests are performed;

.2 instructions on checking installation quality and requirements to tests in mooring mode;

.3 instructions on performing simulation tests including instructions on control and measurement of the parameters as well as on providing values of the controlled parameters;

.4 instructions on comparison procedure and on the required comparability of the parameters obtained during practical simulation and full-scale tests.

4.6.9 According to results of comparative tests on at least two ships, a document shall be drawn up and signed by the surveyor. The document shall include values of comparable parameters, information on test reproducibility and conclusion on possibility to perform simulation tests on the next ships of a series.

4.6.10 Simulation tests shall be performed according to the program (procedure) prepared by results of comparative tests and approved by the River Register.

4.6.11 The program (procedure) of simulation tests includes the following:

.1 general provisions;

.2 requirements to technical condition of the item submitted for tests;

.3 requirements to technical condition of simulation device or other support device or equipment;

.4 guidelines for preparation to tests and their performance including instructions on control and measurement of parameters. Values of the parameters which shall be obtained using simulation device shall be also specified;

.5 diagrams of simulation devices and training courses;

.6 instructions on control comparative tests and their intervals.

4.6.12 In case of use of simulation methods during tests of ship machinery and equipment after inspection the same simulation methods which were used to check items in running mode shall be used.

4.6.13 Check comparative tests using a complete program of full-scale tests shall be performed on serial ships tested using simulation methods in order to confirm reliability and stability of the results of simulation tests within terms approved by the River Register or on the ships with previously assigned hull number (e.g., each third, fifth, tenth, etc.)

The intervals (frequency) of comparative check tests shall be established by the shipbuilding organization considering stability of manufacture and installation quality of the items under technical supervision and reproducibility of full-scale and simulation tests.
4.7 PECULIARITIES OF TECHNICAL SUPERVISION DURING CONVERSION, MODERNIZATION AND REPAIR OF THE SHIPS

4.7.1 The River Register performs technical supervision during conversion, modernization and repair of the ships in service.

4.7.2 Technical supervision during conversion, modernization and repair of the ships is performed according to the approved technical documentation.

Technical documentation shall be submitted for approval for those parts of the hull, ship machinery and equipment which are subject to conversion, modernization, recovery or repair.

4.7.3 Technical documentation on repair shall be developed in the following cases:

The organization has no detailed or design documentation on the repaired ship, detailed or operating documentation on the repaired items under technical supervision.

Impossibility to perform repair works on available technical documentation with respect to functionality of process equipment or technologies (production, control and test) which exist in the organization.

4.7.4 Technical supervision during conversion, modernization and repair of the ships is performed on a contract basis.

4.7.5 At technical supervision during repair of the ships the requirements of these Rules shall be met as regards the following:

.1 Nomenclature;
.2 procedure of design documentation approval (see 3 of these Rules);
.3 scope of technical supervision (type of inspections and trials, including mooring and running trials);
.4 use of materials and welding;
.5 scope of technical documentation submitted for review by the River Register.

4.7.6 Scope and methods of repair determined by the ship repair organization shall be approved by the surveyor.

4.7.7 Fault detection of the ship components shall be conducted by the ship owner considering the requirements of the Rules or standards specially developed for the ships of this project and related to determination of technical condition (see Appendices 2 to 4 to RSSS).

4.7.8 The results of check tests of scope and quality of the works carried out during technical supervision during conversion, modernization and repair of the ships, remarks and requirements of the surveyor shall be drawn up in the form of the documents prescribed by these Rules.
5 HULL AND HULL EQUIPMENT

5.1 GENERAL REQUIREMENTS

5.1.1 This section establishes requirements on technical supervision during manufacture of metal, reinforced concrete and plastic hulls as well as superstructures and wheelhouses irrespective of their participation in global bending of the hull.

5.1.2 Procedure and scope of inspections and tests of hull structures shall be determined according to the List (see 2.3.1) developed considering the peculiarities of production processes, methods of hull and superstructure construction, welding methods, control methods accepted in this shipbuilding organization.

5.1.3 At technical supervision of construction quality of hull structures the following shall be checked:

1. availability of the certificates on flat steel, strip bar, profile iron, bar iron, pipes, cast and forged products, documents on welding consumables;
2. compliance of data specified in the certificates and other documents on the materials, requirements of the Rules and technical documentation approved by the River Register as regards checked structure;
3. compliance of the steel grade, material grade and cast number specified for the parts with the certificate data. If cast number for the parts is not available or replaced with a symbol, it shall be determined by the documents according to the procedure applicable in the organization;
4. compliance of the material grades with the drawing requirements.

5.1.4 Visual examination is required to check the following:

1. compliance of the structure of the item under technical supervision with the drawings and technical documentation, alignment, mating and connection of parts, assemblies and other components, quality of machining and established structural requirements;
2. meeting the requirements of the Rules related to the item under technical supervision;
3. absence of visible defects and deviations from the product shape, quality of removal of temporary mounting parts and facilities;
4. compliance of the welded joint type and parameters of the completed weld with the requirements of the drawing and welding table, absence of external defects.

5.1.5 The following structural parameters are subject to random checks for compliance with the values specified in the drawings:

1. thickness of parts made of sheet material;
2. dimensions of parts of welded and rolled beams, knees, stiffeners, foundation components, coamings, shelves;
3. distance between framing beams;
4. distance between welded joints and beams, ends of knees;
5. spaces between weld joints;
6. dimensions of cutouts, distance between them, distance from the part and support edges, spherical radii;
7. beam cuts, noses, gaps at ends;
8. values of thickness variation, shifts of members and parts;
9. straightness of members, angles of connecting to blades and beams;
10. values of residual deformation parameters (bulges, dents, corrugations, ribbing...
of panels and other construction welding deformations) which shall be within limits specified in production documentation (Appendix 8);

.11 dimensions of weld structural components (weld width, shape and height of strengthening, weld leg, length and pitch of intermittent welds);

.12 dimensions of structural components of rivet joints (width of laps and angle bar faces, pitch of rivet joint, distance between rows of rivets and from rivet axis to the plate edge, dimensions of the rivet components).

5.1.6 When checking quality of welding operations, the surveyor shall refer to the requirements of Part X of RCCS.

5.1.7 At periodical inspections of the organization welding industry (see 2.3.5) the surveyor shall check the following:

.1 quality of welding consumables;

.2 welding methods;

.3 qualification of welders and specialists of non-destructive testing (see 2.8.2.2);

.4 preparation of connections for assembly and welding, quality of tacks of the welded joints and welds;

.5 meeting the technology including protection against bad weather conditions;

.6 methods and scope of quality control of the welded joints.

5.1.8 During technical control according to the List, make sure that the welds have no defect in the form of: cracks in the weld and weld area, unfilled craters, preparation not filled with metal, shifts and narrowing of welds, slag, metal (tungsten), oxide and flux inclusions on the weld face, holes, pores, cavities, low spots between beads, saddles, piling and ripple, undercuts, not smooth transition of the weld to the base metal, irregular shape of the weld.

5.1.9 The surveyor shall check quality of the welds made by the organization personnel using non-destructive testing, if it is prescribed by the Rules. The following shall be checked:

.1 availability of the approved monitoring diagram of the welds;

.2 compliance of the control method approved by the River Register;

.3 compliance of the quantity of the tested areas of the welds and their location with the monitoring diagram considering additional and check tests.

.4 test results according to the documents of the organization.

5.1.10 Radiographs and gammagraphs, reports on ultrasonic testing shall be subject to random checks. The welds shall be opened to determine the types of defect.

5.1.11 Hull tightness tests shall be performed according to the test patterns approved by the River Register and developed according to Appendix 10.

5.1.12 At technical supervision during hull tightness tests the following shall be checked:

.1 preparation of a room (compartment) for testing;

.2 methods and conditions of trials;

.3 coverage of the structures and welds by the tests;

.4 sequence and procedure of process operations and functional inspection by the organization;

.5 accuracy of tightness estimation;

.6 quality of elimination of unsound spots.

5.2 TECHNICAL SUPERVISION DURING MANUFACTURE OF ASSEMBLIES, SECTIONS AND BLOCKS

5.2.1 During manufacture of structural parts, assemblies, sections and blocks, it is necessary to perform functional inspection and stage-by-stage control established by the production processes and standards.

5.2.2 Test benches, jig plates, beds and other equipment prior to assembly shall be preliminary calibrated to provide permitted accuracy of the overall dimensions of the assemblies, sections and blocks, smoothness of their outlines according to the drawings and ordinates removed from mold loft.

5.2.3 During construction of the serial ship hulls, technical supervision at this stage in-
includes periodic examinations of the manufactured sections and separate assemblies. Their tests are performed at the following stages of hull construction: as part of blocks, sections, hull parts in pre-slipway positions or as part of the hull on the slipway.

5.2.4 The following shall be performed at technical supervision during construction of sections:

1. material test according to 5.1.3;
2. external examination of sections according to 5.1.4, components of welded structures according to 5.1.8;
3. checking dimensions according to 5.1.5;
4. flaw detection of the welds according to 5.1.9;
5. checking the conditions and results of the tightness tests according to 5.1.11 and 5.1.12.

5.2.5 Completely ready sections and separate assemblies shall be supplied to the places of block formation accepted by the organization’s quality control department and after the surveyor’s inspection if prescribed by the List.

5.2.6 Blocks shall be submitted for inspection according to the List after completion of the assembly-welding and fitting works as well as tightness tests.

5.2.7 At technical supervision during construction of blocks, make sure that:

1. Quality of installation of sections included in the blocks provides continuity of the hull. Coupling of the longitudinal members determining global strength is carefully checked;
2. Use of bottom-hole parts and assemblies improves the quality of intersection connections;
3. Allowances in the sections, bottom-hole parts and assemblies are within tolerances established by technical documentation, cuts in the places of intersection connections allowing to make high quality butt welds;
4. Field connections on the hull plating are welded first on the inside and then after removing weld root — on the outside of the hull;
5. Deformation parameters do not exceed values specified in Appendix 11.

5.3 TECHNICAL SUPERVISION DURING CONSTRUCTION OF THE METAL HULL ON THE SLIPWAY

5.3.1 Sections and assemblies shall be supplied to the slipway completely ready and accepted by the shipyard’s quality control department and inspected by the surveyor if prescribed by the List.

Sections and blocks shall be checked for compliance with the approved technical documentation. The necessity and procedure of installing temporary reinforcements and parts, the values of allowances on mounting edges to provide proper quality of the slipway assembly by the River Register shall not be determined.

5.3.2 At technical supervision during the slipway assembly the surveyor shall check the following:

1. proper installation of sections and blocks relative to the slipway base lines and previously installed sections and blocks;
2. proper coupling of sections by plating and by members and preparation of intersection connections for welding;
3. dimensions and quality of welds;
4. values of welding deformations of the hull, superstructures and quality of deformation flattening (see Appendix 11).

5.3.3 If the sections or blocks were inspected and tested during their manufacture, the scope of technical supervision shall include inspection to make sure that there are no damages in the result of transportation and installation.

5.3.4 Hull spaces shall be submitted for inspections and tests according to the List after completion of all the works on assembly, welding, riveting and flattening as well as installation of all the saturating parts connected directly to the hull structures. The structures adjoining to the checked space, shall be finally welded at a distance of at least 1 m from this space.
5.3.5 During detection of cracks in the hull structures the surveyor shall notify the organization and check the structure condition. During detection of cracks, measures shall be taken on detection and elimination of the crack causes. Hull works in the areas specified by the surveyor shall be stopped. The damaged structures shall be removed from the hull or shall be corrected with complete removal of cracks according to the technology approved by the Branch Office.

5.3.6 When analyzing the results using non-destructive testing, straining ties and areas subject to vibration as well as quality of fillet and T-butt welds, welding of which is prescribed by full penetration shall be checked. Tightness tests of the welds shall be combined with tightness tests of the hull according to the diagram approved by the Branch Office. Tightness test results of the welds performed prior to hull testing, shall be checked according to the organization’s documents.

5.3.7 At technical supervision during construction of the hull on the slipway, the surveyor shall check sequence of hull formation as well as tests of the hull position on the slipway and keeping slipway log by the organization.

5.4 TECHNICAL SUPERVISION DURING CONSTRUCTION OF REINFORCED-CONCRETE SHIPS

5.4.1 During technical supervision of a ship under construction, the following shall be checked:

1. quality of the materials used for hull construction according to the certificates and laboratory analysis data;
2. quality of the reinforced steel billets, proper manufacture of reinforcing cages and fabrics, installation and attachment of fittings with embedments and line ups;
3. proper dosage of the concrete components, quality of concrete preparation, its laying and vibration compaction;
4. compliance with temperature and moisture conditions, concrete hardening time as well as concrete strength before removal of the sections from the matrices;
5. compliance of sections with the design requirements after their removal from the matrices and drawing up datasheets or logs of sections;
6. readiness of the slipway, its leveling and markings;
7. proper section installation on the slipway, installation, welding and grinding of bar joints, installation of embedments and line ups in field joints, preparation of the section edges for concreting;
8. proper concreting of bar joints, concrete quality, compliance with temperature and moisture conditions at its hardening;
9. compliance of the hull components with the design prior to its shift from the slipway position. The hull shall be inspected outside and inside and the dimensions of these components shall be checked. Prior to shift, concrete strength of bar joints shall be checked.

5.4.2 During manufacture of solid reinforced-concrete hull, proper installation of the formwork and thickness of the protective layer, obtaining the required temperature and moisture conditions at curing of concrete and time of formwork removal shall be checked.

At intervals in concreting, readiness of the surfaces of the previously laid concrete shall be checked.

5.4.3 At technical supervision during tests, the reinforced-concrete ship hull shall be checked according to the test patterns approved by the Branch Office and developed according to the methods and scope of tests as per GOCT 5 R.0276.

5.5 TECHNICAL SUPERVISION DURING CONSTRUCTION OF PLASTIC HULL SHIPS

5.5.1 At technical supervision during construction of the ship, the following shall be checked:

1. results of the material laboratory analysis prior to their use. The main parameters shall comply with technical documentation on manufacture of these materials;
5 Hull and Hull Equipment

5.5.2 When preparing for formation of hull structures, the surveyor evaluates the following:

1. quality of preparing and applying release agents;
2. quality of preparing the binding materials and proper cutting of reinforcing materials.

5.5.3 During formation of the hull structures, the following shall be checked:

1. proper laying of fiberglass, warp direction and quantity of layers, gaps between coupled panels;
2. uniform impregnation and sealing of the reinforcing material;
3. absence of foreign inclusions;
4. process allowances for physical tests.

5.5.4 After formation of the hull structures, their holding period shall be checked according to technical documentation:

5.5.5 When inspecting the ready assemblies and sections, absence of the following shall be checked:

1. unacceptable deviation of the section dimensions from those specified in the drawings;
2. external and internal defects;
3. unacceptable deviation from the given thicknesses, straightness and thickness variation.

5.5.6 Temperature and relative air humidity shall be reported during manufacture of the sections, blocks of the hulls and superstructures.

5.5.7 The surveyor shall check physical and mechanical properties of the hull structure material, determined using a destructive method according to the requirements of the Rules (by results of laboratory tests of dry samples).

5.5.8 The surveyor shall make sure that the hulls made of fiberglass are repaired using the same materials as for construction. The hull repair procedure shall be approved by the Branch Office.

5.6 TECHNICAL SUPERVISION DURING MANUFACTURE OF STRUCTURAL FIRE PROTECTION

5.6.1 At technical supervision during manufacture of fire protection structures on the ship under construction, the following shall be checked:

1. certificates for materials;
2. insulation thickness and dimensions of air gaps, quality of insulation fastening to metal base, compliance with the technology of applying insulating materials when forming fire bulkheads and decks;
3. transition pieces of the electrical route pipes and ventilation ducts through fire divisions;
4. equipment of dangerous spaces;
5. equipment of liquid fuel and lubricant storage facility;
6. compliance with the requirements related to the ship purpose.

5.6.2 During technical supervision of manufactured fire doors and other closures, the following shall be checked:

1. serviceability and density of closures;
2. their opening and closing by one person;
3. operation of the closure of self-closing doors when controlled from local and remote (if any) stations;
4. closures of ventilation ducts, ring spaces around smoke pipes, skylights of the machinery, boiler and pump rooms.

5.6.3 Quality of materials used for internal insulation and equipment shall be checked by the surveyor on the documents on the materials and visual inspection for compliance with the approved design documentation.
5.7 TECHNICAL SUPERVISION DURING MANUFACTURE OF EQUIPMENT OF SPACES, CLOSURES, FENCINGS, LADDERS AND COMPONENTS OF DEVICES CONNECTED TO THE UNDERWATER PART OF THE HULL

5.7.1 During technical supervision of corridors, exits, doors and ladders, compliance with the drawings and Rules shall be checked:

.1 passages intended for quick escape of people to lifeboat and liferaft embarkation areas;
.2 type and dimensions of doors;
.3 direction of door opening;
.4 length of dead-ends in corridors;
.5 width of exits from halls, accommodation and service spaces;
.6 width of main corridors in the area of accommodation spaces for passengers and the crew;
.7 width of inclined ladders and dimensions of the platforms.

5.7.2 Upon completion of the closure installation the surveyor shall check the following:

.1 compliance of device and closure structures with the drawings;
.2 contact of seal gaskets with bead edges;
.3 easy and free (smooth) opening, closing, shifting and battening of the closures;
.4 compliance of the coamings height with the drawing and requirements of the Rules;
.5 quality of welds in places of closure connection with the hull, superstructures and wheelhouses;
.6 fastening of removable boards for glasses;
.7 tightness test results.

5.7.3 During technical supervision of manufactured guard rails, bulwark and catwalks, the following shall be checked:

.1 quality of welded joints of bulwark and catwalks;
.2 compliance of the distance from the deck to the foot line of guard rails and distance between other guard rails with the requirements of the Rules;
.3 compliance of the bulwark and guard rails height with the requirements of the Rules.

5.7.4 Upon completion of the foil arrangement installation the following shall be checked

.1 compliance of foil angles of attack with the design;
.2 fastening of the foil arrangement to the hull;
.3 availability and efficiency of the arresters preventing loosening of nuts.

5.7.5 Upon completion of the hovercraft flexible skirt installation the following shall be checked:

.1 installation and fastening of the flexible skirt;
.2 availability and efficiency of the arresters preventing loosening of nuts.

5.8 CHECKING HULL READINESS FOR LAUNCHING

5.8.1 The hull shall be launched according to the production process approved by the River Register (see 3.1.10).

5.8.2 Prior to approval for launching, the surveyor checks the documents of the organization and River Register drawn up in the process of technical supervision confirming stage-by-stage control and tests:

.1 hull structures;
.2 hull structure tightness;
.3 weld joints;
.4 installation of stern tubes, propeller shafts and propellers, rudders, nozzles, dampers, and thrusters if these operations are performed when the ship is afloat;
.5 bottom and side valves;
.6 tightness of joints between the navigation equipment and the hull;
.7 installation and fastening of hovercraft foil arrangement and flexible skirts;
.8 installation of the thruster;
.9 installation and reliability of manhole covers in the inner bottom plating and tanks, closures of openings in watertight bulkheads;
.10 plugging of temporary openings in the hull;
.11 application of load line and draught marks;
.12 main dimensions and hull shape with the dimension tables attached;
.13 completeness and quality of application of paint coatings to the underwater part of the hull (see 5.8.6 and 5.8.7).

5.8.3 Upon satisfactory results of the tests specified in 5.8.2, the surveyor shall draw up an approval for ship launching by making a record in the Notice and in the protocol on the ship readiness for launching.

5.8.4 According to results of inspection of all the ship compartments after launching, the quality control department shall draw up a report and submit it to the surveyor.

5.8.5 The ship's bottom shall be submitted for inspection in the dock or on the slipway, if:
.1 The ship's bottom is damaged during launching;
.2 Leakage is detected in the underwater hull;
.3 Defects are detected or there are grounds to suspect inadmissible defects in the bottom which appeared during launching, outfitting or trials of the ship.

5.8.6 Diagrams of coating, painting and cementing, quality control of their use on inland navigation ships including performance of technical documentation shall not be selected by the River Register.

5.8.7 For river-sea navigation ships, the River Register performs technical supervision of painting of the underwater hull, cargo spaces and ballast tanks of dry cargo ships and tankers. During technical supervision the surveyor checks compliance of the used coating materials with the painting list approved by the River Register, availability of the documents (see 2.2.6.3) on coating materials (for interior spaces) and compliance with the application method on the hull structures.
6 POWER INSTALLATION AND SYSTEMS

6.1 GENERAL REQUIREMENTS

6.1.1 This Section establishes requirements for technical supervision during manufacture, installation and testing of the follow products subject to technical supervision by the River Register according to Section 4 of the Nomenclature: main and auxiliary internal combustion engines, reduction gears and reverse reduction gears, disengaging couplings and flexible couplings, compressors, pumps, fans, separators, deck machinery, shafts, propellers, systems and piping, boilers, heat exchangers and pressure vessels, and refrigerating equipment.

6.1.2 Scope and procedure of checks and tests of the products specified in para 6.1.1 is determined by the List developed by the organization upon the Nomenclature and Rules requirements taking into account specifics of manufacture, assembly, installation, and control methods and procedures, adopted by organization in accordance with the Branch Office.

6.1.3 All materials, including forgings and castings, associated equipment and items, used in manufacture of products specified in para 6.1.1 and their parts or intended for assembling the set, should be provided with certificates or other documentation verifying the material, product and technological process compliance with the requirements of technical specification approved by the River Register. In case specified by the Nomenclature parts and items shall be stamped.

6.1.4 Technical supervision during manufacturing and installation of parts includes conformance inspection of the measurement results in all measure points and sections, specified in detailed documentation and installation and operating instructions to the product and results of non-destructive testing of parts as prescribed by the Rules, documentation agreed with the River Register. Linear and angular dimensions, mounting clearances, form deviation, roughness, hardness and material structure are subject to measurement.

6.1.5 Technical supervision of rectification of castings, forgings and welding constructions surface defects shall be based on requirements of technical documentation, agreed with the River Register and requirements of Part X of RCCS. Parts and items after defects rectification are subject to non-destructive control, if so required by Rules and technical specification.

6.1.6 In technical supervision during product and their components manufacturing, the Surveyor shall:

- verify the quality of material and heat treatment as well as availability of the associated equipment through the documentation;
- control hydraulic and atmospheric tests of the products;
- ensure the random visual inspection and the quality control of the processing, dimension compliance with detailed drawings, technology compliance and use of flaw detection prescribed by process documentation;
- verify the compliance of manufactured parts, assemblies and items under technical supervision to the technical documentation requirements;
- check for marking as per agreed technical documentation.
6.1.7 Products being subjected to a hydraulic test in accordance with the Rules requirements, shall be preliminary heat treated and machined.

For product hydraulic test residual deformations, sweating and leakage are considered as rejection sign.

6.1.8 Results of hydraulic test are to be recorded in the test log indicating the following information:

1. description of the item;
2. manufacturing number;
3. drawing number;
4. working pressure;
5. hydraulic test pressure;
6. test results and data on permitted defect rectifications;
7. testing date.

Reliability of this information shall be certified by the signature of the representative from organization's QC service.

6.1.9 Tested items and parts shall be stamped in plain view with the detail number, mark of the manufacturer's QC service, working and test pressure values.

Ship machinery safety valves being hydraulically tested shall be adjusted as per Rules, air tested and sealed by organization's QC service.

6.1.10 Technical supervision of repair of the items specified in para 6.1.1 shall be provided by the organization approved for works of such type, granting the technical documents for repair agreed with the River Register.

6.1.11 Parts and hinged units replaced during repair are subject to the same tests as new ship machinery during manufacturing.

6.1.12 Once ship machinery is repaired, the River Register ensures the technical supervision of testing of parts and assembly units subjected to the same test types as new ship machinery during manufacturing.

6.1.13 Engines thoroughly repaired are to be verified for compliance to standards for emissions according to the test program developed in accordance with Appendix 12.

6.1.14 Upon satisfactory results of tests and checks, the River Register issues documents on products, as provided in Rules.

**General requirements to bench tests procedure**

6.1.15 After product manufacturing and acceptance by manufacturer's QC service, in cases stipulated by the Rules and agreed with technical documents, bench tests are executed in the presence of the Surveyor according to program approved by the River Register.

6.1.16 Prior to start product testing, the Surveyor shall be provided with the following:

1. organization document on bench readiness for testing;
2. arrangement of the equipment and instrumentation, as well as bench specification;
3. documents on instrumentation checkout and calibration of bench or standard devices;
4. document from organization's QC service on accomplishment of factory tests providing results of controlled parameters;
5. technical documentation on manufacturing and delivery of the product, as well as associated equipment in case of its installation on the bench with the product subjected to the testing;
6. description and maintenance instruction, drawings, results of parts and mounting dimensions measurement;
7. completed logbook (datasheet) for the item under test;
8. test program (when it is an integral part of the agreed technical documents).

6.1.17 Continuity of test modes can be disrupted only once not more than for 15 minutes due to failure while forced shutdown of the item under test. Once all the deficiencies are rectified, the item shall be tested again, from the mode where the forced shutdown occurred.

In cases of forced shutdown exceeding 15 minutes, or repeated tested item shutdown, or replacement of tested item components, the test is considered failed. It can be restarted only after analysis and removal of all
causes and defects, interrupting continuous operation of the item under test.

6.1.18 After bench tests, product units and parts shall be subject to inspection. Scope of the inspection and analysis shall be determined on the results of checks or tests and adjusted on the basis of detected defects nature.

6.1.19 In case of inspection with product partial dismantling it shall be concluded by control tests carried out in the presence of the Surveyor. Control tests shall be carried out in mode of rated load or expected working load.

Technical parameters got while control testing, shall be recorded in the product supporting documentation (file, datasheet, operating guidance, etc.)

6.2 TECHNICAL SUPERVISION DURING MANUFACTURE

Internal combustion engines

6.2.1 Technical supervision during manufacture of internal combustion engine parts and units involves checking of their conformance to the requirements of the Rules and agreed technical documentation in regard to the following:

.1 structures, materials, chemical and heat treatment, mechanical and physical and chemical surface properties;
.2 size, shape, location and roughness of base mating surfaces, axes straightness, mating parts setting
.3 quality of welding, threaded and other joints, fixation and locking of connecting parts;
.4 adhesive uniformity and strength of antifriction, antiwear and other coatings;
.5 presence of defects, their nature and repair;
.6 flaw detection of forged and cast steel parts, welded joints;
.7 hydrostatic tests (see 6.2.2);
.8 availability of technological base, lugs and openings, final machining allowances;
.9 deviation from the profile and contact area in gearings;
.10 crankshafts static and dynamic balancing;
.11 determination of harmful substances emissions in exhaust gases.

6.2.2 Parts, pipelines and units of internal combustion engines operating under excessive pressure shall undergo hydraulic test according to the requirements of Table 2.3.2 after final machining and before protective coating is applied.

<p>| Table 6.2.2 |</p>
<table>
<thead>
<tr>
<th>Part / assembly description</th>
<th>Test pressure, MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder cover — cooling space</td>
<td>0.7</td>
</tr>
<tr>
<td>Cylinder liner over the whole length of the cooling space</td>
<td></td>
</tr>
<tr>
<td>Piston crown — cooling space after assembly with a piston rod, if the latter forms a sealing</td>
<td></td>
</tr>
<tr>
<td>Cylinder block — cooling space</td>
<td>0.4, but not less than 1.5p</td>
</tr>
<tr>
<td>Exhaust valve (body) — cooling space</td>
<td></td>
</tr>
<tr>
<td>Turbocharger — cooling space</td>
<td></td>
</tr>
<tr>
<td>Exhaust piping — cooling space</td>
<td></td>
</tr>
<tr>
<td>Coolers’ each side</td>
<td></td>
</tr>
<tr>
<td>Engine-driven pumps (lubricating oil, fuel boosters, bilge) — working spaces</td>
<td></td>
</tr>
<tr>
<td>Engine-driven compressors including cylinders, covers and air coolers: the water side</td>
<td>1.5p</td>
</tr>
<tr>
<td>Engine-driven compressors including cylinders, covers and air coolers from the air side</td>
<td></td>
</tr>
<tr>
<td>Casings of the high pressure fuel pumps (the pressure side), fuel atomisers and fuel pipes</td>
<td>1.5p or p + 30, whichever is the less</td>
</tr>
</tbody>
</table>

1 Air coolers of turbochargers shall undergo hydraulic test only from the water side.

Notes: 1. p — working pressure, MPa.
2. These hydraulic test norms do not apply to fuel pumps with plunger controlling edge.

6.2.3 The engine is to be assembled from parts and units, accepted by organization’s QC service. Prior to assembling they are subject to inspection by the Surveyor.

6.2.4 In the course of technical supervision of the engine assembly, the following shall be checked;
1. base frame positioning as per technical documentation;
2. alignment of main bearings soles;
3. fitting of main bearing inserts by soles and of journal-and-thrust bearing;
4. crankshaft laying with check of journals fit to the bearings, shaft line, journals beat and crankshaft deflections;
5. installation and fastening of cylinder block, mating surfaces fitting;
6. tightening load of threaded joints;
7. deflections (again) after anchor ties tightening and flywheel installation;
8. installation and alignment of gas distribution drives, camshaft and hinged units;
9. installation of cylinder and piston group parts;
10. installation of assembled cylinder heads;
11. installation and alignment of inhalers;
12. installation of engine set;
13. parts locking.

6.2.5 After assembling, running-in and adjustment, the Surveyor shall ensure the technical supervision of engine bench test performance according to the program agreed with the River Register.

6.2.6 In the course of technical supervision of bench test performance, the Surveyor shall base on requirements of 6.1.15 – 6.1.19 with regard to the following:
1. main engines intended for operation;
2. engines intended for generators drive, pumps, compressors shall be tested by load characteristic;
3. new design solutions as for the engine – transmission – propeller system shall be tested according to the program which takes into account those solutions;
4. bench engines shall be tested along with all standard devices, apparatus and automatic control, general alarm system and protection devices;
5. bench test duration shall be specified in accordance with Table 6.2.6.5. In this case, the following shall be considered:

- engines operated on load characteristic shall be tested being in modes 1-6 at rated speed;
- modes 5 and 6 are mandatory during testings;
- engine steady state operation duration shall be sufficient for stabilization of operating process characteristics after mode activation and measurements and checks accomplishment as per test program;
- during control tests (see 6.2.8) engine operation duration in mode 5 shall not exceed 25% of time specified in Table 6.2.6.5, but shall be not less than 30 min;

Table 6.2.6.5

<table>
<thead>
<tr>
<th>Mode No.</th>
<th>Engine operation parameter values, % of rated values</th>
<th>Engine test time, h, at rated rotation speed, rpm^-1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Power Rotatio n speed</td>
<td>Moment in</td>
</tr>
<tr>
<td>Idle run mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>not standardized</td>
<td>0</td>
</tr>
<tr>
<td>Ahead running under propeller load</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>63</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>80</td>
</tr>
<tr>
<td>4</td>
<td>75</td>
<td>91</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>110</td>
<td>103</td>
</tr>
<tr>
<td>Astern running mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>not standardized</td>
<td>1.0</td>
</tr>
<tr>
<td>Minimum steady rotation speed mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>not standardized</td>
<td>0.5</td>
</tr>
<tr>
<td>Total test time</td>
<td>14</td>
<td>12</td>
</tr>
</tbody>
</table>

Note: Modes 7 and 8 shall be applied only if the engine design provides for running at these modes.

6. systems of control, regulation, alarm and protection, locking and cutoff, starting reversing engine characteristics, regulators functioning shall be tested before activate engine's mode;
7. testings of automated control system shall be based on individual program agreed upon with the River Register;
.8 operation of the engine shall be tested in all modes specified by program methodology, work process parameters and characteristics specified in technical documentation and test program are to be recorded;

.9 work process parameters shall be measured at least twice under engine steady operating conditions;

.10 measuring torsional vibration parameters (in cases specified in para 6.1.1 Part IV RCCS).

6.2.7 Engine testings to ensure the compliance of their specifics concerning harmful substances emissions and opacity in exhaust gases with the standardized values are to be performed as per approved test program, developed in accordance with Appendix 12. Engine type and model as basic engine of the family for testing shall be chosen by the manufacturer.

During manufacture of one family series engines, their parameters and rated values concerning harmful substances emissions and opacity in exhaust gases shall be admitted based on the testing results of a family basic engine.

If the engine design was modified so that the changes introduced effect the content of harmful substances and opacity in exhaust gases of the engine, the measurements specified in the first subparagraph of this para shall be also performed for the series engine.

6.2.8 During technical supervision it shall be taken into account that after bench tests envisaged by test program, depending on check results specified in para 6.2.6, assembly units and engine parts are subjected to the inspection with visual and dimensional examination in the scope agreed with the Surveyor.

6.2.9 If at engine inspection it was partially dismantled, engine control tests shall be carried out with technical supervised by the River Register Surveyor check of working process parameters and engine efficiency, as well as of its arrangements and systems given below;

.1 starting devices;

.2 reversing unit;

.3 alarm and protection system, safety devices;

.4 automated control system;

.5 rotation speed control system.

6.2.10 The Surveyor ensures that in case of unsatisfactory check results, after full elimination by manufacturer of defects affecting the performance of this unit or system, the repeated engine operation checks are carried out in accordance with 6.2.8.

6.2.11 The manufacturer shall provide along with engine the following documents:

.1 technical file;

.2 assembly and sub-assembly engine drawings in scope specified by technical specification;

.3 hinged units files provided by manufacturers;

.4 technical datasheet and operating and maintenance instructions containing detailed description of engine units and special-purpose tool;

.5 spares list;

.6 instrumentation datasheets;

.7 post-assembly engine acceptance certificate issued by the organization;

.8 engine bench test report (checking test);

.9 post-test engine inspection certificate issued by the organization;

.10 technical datasheet of harmful substance emissions and opacity in exhaust engine gases (prepared as per ГОСТ 31967);

.11 record book of engine parameters for recording of all changes in configuration and adjustments (may be integral part of the data sheet or engine file). The record book shall contain the description of all changes related to design characteristics of the engine, including adjustments, replacement of components or design changes of engine components allowing the evaluation of the emission level.

6.2.12 Accomplished tests and supporting documents checking shall be accompanied by the issuing of certificate (PP-8.1 form). This certificate shall contain the information on values of harmful substances and exhaust
gases opacity, got while basic engine of the family testing (see 6.2.7).

Shafting

6.2.13 In technical supervision during shafting manufacturing the following shall be checked:

.1 conformity of material quality to the requirements of approved technical documentation, heat treatment mode and flaw detection results;
.2 work surface roughness, size and shape;
.3 shaft radial run-out, axial run-out of flange faces and thrust collar, external and internal surfaces concentricity or hollow shafts wall thickness;
.4 section shape and key slot preparation, key slot position about an axis of the shaft and cone;
.5 assembly and alignment keeping at shaft connections, interference fit and gaps of connection;
.6 surface for facing with sufficient clearance to ensure the interference as per drawings.

6.2.14 The completely finished shafts are subject to visual inspection. The following shall be determined by the Surveyor:

.1 surface defects parameters do not exceed the norms set by the drawing technical requirements;
.2 shaft journals shall be free from chippings, scratches, notches or burrs;
.3 shaft threads shall be clean, without burrs or strips;
.4 fillets shall be made smoothly, seams shall be free from sharp edges and burrs.

Upon satisfactory results of checks, flaw detection and measurements, shafts shall be stamped by the River Register, if prescribed by the Nomenclature.

6.2.15 During the manufacture and after facing final processing, the Surveyor shall verify the following:

.1 compliance of material properties to the requirements of technical documentation;
.2 flaw detection results;
.3 the absence of defects on facing external surfaces;
.4 sizes ensuring guaranteed interference fit while facing fitting on the shaft;
.5 results of hydraulic test for facing tightness or welded shells before fitting on the shaft (see 6.2.16).

6.2.16 The Surveyor shall verify that propeller shaft and stern tube facings are hydraulically tested by pressure not less than 0.2 MPa.

6.2.17 After fitting the facing on the propeller shaft and final processing, the Surveyor shall control the results of the following checks performed by the manufacturer:

.1 absence of defects on facing external surfaces;
.2 work surfaces size, shape, roughness and radial run-out;
.3 quality of facing welds, welded on shaft, by the leak test results (by air or oil) under pressure of 0.2 MPa and/or using liquid penetrant method;
.4 quality of sealings of shafting ends.

6.2.18 Water insulation of the shaft shall be verified for absence of saggings, blistering or entrapped air.

6.2.19 Finally manufactured couplings, connecting bolts, main bearings and thrust bearings, stern units, sealings and glands are to be verified by the Surveyor before their installation. Final control of flange half-couplings by the external and end surfaces shall be performed after their fitting on the shaft.

Gears, disengaging and elastic couplings

6.2.20 In the course of technical supervision during manufacturing of parts and assemblies of main engines gears and disengaging couplings, the Surveyor shall verify the following:

.1 Treated shaft journals, surfaces for facing, teeth cutting parameters, gear rings, surfaces or sealing and connections, keyways, threads, deviation from the profile, radial run-out, end surfaces squareness to the shaft axis,
axial run-out, chemical and heat treatment, protective coatings comply with the requirements of technical documentation approved by the River Register.

.2 Critical parts were subject to flaw detection.

.3 Fitting in connections were carried out with required interference fit (clearance).

.4 Finally assembled and treated gear-wheels, pinions, shafts with couplings and half-couplings assemblies as per 4.3.2 Part IV RCCS shall be statically and/or dynamically balanced.

6.2.21 After execution of welding works and heat treatment, while inspecting finally treated parts of the gear boxes and couplings, the Surveyor shall control:

.1 welds, including flaw detection methods;

.2 treated bearing surfaces of foundations and flange connections of individual hull parts;

.3 boring of the soles for bearings and sealings;

.4 alignment of soles borings for bearings of each shaft;

.5 quality and reliability of connections of individual gear box parts or coupling;

.6 mutual alignment of in gear shaft axis.

Gear box is subject to the tightness test, and hydraulic coupling case – to the hydraulic test.

6.2.22 When assembling gears and couplings, the Surveyor shall control:

.1 fitting of bearing by soles, standard shaft or false shaft journals, clearances of journal and thrust bearings;

.2 centre-to-centre spacing and mutual alignment of shaft axis;

.3 gear backlashes and tooth contact;

.4 quality of coupling assembling, hinged units and systems serving gear;

.5 alignment of gear with drive motor and loading device;

.6 quality of coupling drive and driven parts assembling.

6.2.23 For bench tests, gears and disengaging couplings shall be equipped in accordance with the approved technical documentation. During bench testings, provisions 6.1.15 – 6.1.19 shall be taken into account.

6.2.24 When testings are completed, gears and disengaging couplings are subject to inspection and to control tests, where the following shall be verified:

.1 reversing provided by transmission design;

.2 disconnection of the transmission from the prime mover or driven load;

.3 alarm and protection systems, safety devices;

.4 automated control system;

.5 smoothness of changing of the prime mover rotation speed within minimum steady to the rated one.

Propellers

6.2.25 In the course of technical supervision during propellers and their parts manufacturing, the Surveyor shall control:

.1 design parameters and size compliance with the technical documentation approved by the River Register;

.2 quality of the material for blanks, forgings and castings intended for propellers and their parts manufacturing (through the documentation furnished);

.3 results of flaw detection, carried out in accordance with the technical documentation;

.4 absence of internal or surface defects as per technical documentation for propellers approved by the River Register;

.5 interchangeability and difference in weight between standard and spare blades of detachable-blade propellers;

.6 results of static and/or dynamic balancing of propellers and water-jet propeller rotors after machining and fully assembled.

6.2.26 The scope of the technical supervision of the specially designed propellers parts (for example, rotating-blade, columns, paddle wheels), as well as types, sequence of tests and checks carried out during the technical supervision of their manufacturing, shall be determined by the River Register.
6.2.27 In the course of technical supervision during manufacturing of parts and assemblies of compressors, pumps, fans and separators, the Surveyor shall verify their compliance with the Rules and approved technical documentation. This verification shall be based on provisions 6.1.6 and other requirements of these Rules.

6.2.28 In the course of technical supervision during hydraulic tests of compressors, pumps, fans and separators parts, operating under excessive pressure, to be carried out after final machining and before protective coating, results of these tests shall be checked by the Surveyor as well. The correct choice of the hydraulic test pressure determined by the formula given below (MPa), shall be checked:

\[ p_{test} = (1.5 + 0.1k)p, \]  

(6.2.28)

where \( k \) — coefficient adopted from Table 6.2.28;

\( p \) — working pressure, MPa.

In all cases the test pressure shall be admitted not below the pressure corresponding to full opening of safety valve but not below 0.4 MPa for cooled chambers of parts and sealings of different types and not below 0.2 MPa in other cases.

In case the working pressure given in Table 6.2.28 is exceeded, test pressure shall be approved by the River Register.

6.2.29 Parts and units of pumps, fans, filled with oil products or their vapours under hydrostatic or atmospheric pressure, shall undergo tightness test. In welded structures it is sufficient to test only tightness of welds.

6.2.30 In the course of technical supervision during the assembling and installation of the compressors, pumps, fans and separators, the Surveyor shall verify the following:

1. Shafts shall be placed in bearings, fitted by soles and journals;
2. Required clearances in bearings and sealings, between operating elements and housings shall be maintained;
3. Shaft shall be aligned with the prime mover;

4. Required contact in gear meshes shall be provided;
5. Protective and safety devices shall be adjusted.

6.2.31 After assembling, running-in and adjustment, the Surveyor shall ensure the technical supervision of bench test performance (see 6.1.15 – 6.1.19), where compressors, pumps, fans and separators serviceability shall be checked and all parameters specified by the technical documentation shall be recorded, as well as following devices shall be tested in operation:

1. automation equipment;
2. safety devices.

6.2.32 Safety devices shall be tested in operation and sealed by the manufacturer's QC service.

6.2.33 Technical supervision of the boilers, heat exchangers and pressure vessels, their parts and units manufacturing and of process operations performing shall be carried out by the Surveyor in accordance with the technical documentation approved by the River Register.

6.2.34 Soundness of plates, forgings and castings, designed for parts and units of boilers, heat exchangers and pressure vessels shall

### Table 6.2.28

<table>
<thead>
<tr>
<th>Working temp., °C, at</th>
<th>Value ( k ) at working pressure ( p ) up to, MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to</td>
<td>carbon steel</td>
</tr>
<tr>
<td>120</td>
<td>0</td>
</tr>
<tr>
<td>200</td>
<td>1</td>
</tr>
<tr>
<td>250</td>
<td>2</td>
</tr>
<tr>
<td>300</td>
<td>3</td>
</tr>
<tr>
<td>350</td>
<td>5</td>
</tr>
<tr>
<td>400</td>
<td>8</td>
</tr>
<tr>
<td>430</td>
<td>11</td>
</tr>
<tr>
<td>450</td>
<td>17</td>
</tr>
<tr>
<td>475</td>
<td>20</td>
</tr>
<tr>
<td>500</td>
<td>11</td>
</tr>
</tbody>
</table>
be determined by their surfaces visual inspection.

6.2.35 Scantling of parts before assembling of items under technical supervision shall be checked for compliance with those specified by the drawings and drawing technical requirements.

6.2.36 In the course of technical supervision during assembling of parts and units of items under supervision, the compliance of gaps between the members and tolerances specified in the technical documentation approved by the River Register, shall be checked. Align mated elements by creating excessive push-up load or cold shock straightening is not allowed.

6.2.37 Before welding, bevel and gaps are to be verified on their compliance with the drawings approved by the River Register. The bevel surface shall be free from cracks, delaminations or other defects.

6.2.38 Welding operations shall be carried out with welding consumables specified in the technical documentation approved by the River Register.

6.2.39 Welded joints quality control shall be performed after heat treatment (if applicable).

Methods and scope of quality control of the butt welded joints shall be specified in the technical documentation.

6.2.40 Fittings of boilers, heat exchangers and pressure vessels are subject to the hydraulic strength test (see 6.2.28) before installation at their standard places.

6.2.41 Parts and units of boilers, heat exchangers and pressure vessels are subject to the hydraulic strength test by a test pressure as per standards of ГОСТ 22161, before being assembled.

Hydraulic test by a test pressure shall be carried out in the presence of the Surveyor when meeting the following requirements:

1. All assembly, welding and welds control operations are finished and accepted by the manufacturer's QC service (confirmed by the document on part or unit readiness for hydraulic test issued by the manufacturer's QC service);

2. Components of the item under technical supervision are not insulated or coated with other protective coating;

3. Part or unit was subject to the Surveyor examination.

6.2.42 Assembled boilers, heat exchangers and pressure vessels without fittings and insulation or other protective coatings shall be subject to internal survey and hydraulic strength test by a test pressure as per standards of ГОСТ 22161.

**Refrigerating plants**

6.2.43 Technical supervision during manufacturing of the refrigerating equipment for transport, refrigerated and catching vessels shall be carried out as per approved technical documentation.

6.2.44 Technical supervision during manufacturing of the refrigerating equipment specified in 6.2.43 includes the following:

1. verification of technical documents;

2. verification of parts, units and assembling parts;

3. verification of welded and soldered joints quality;

4. technical supervision during hydraulic strength testing;

5. technical supervision during pneumatic tightness testing;

6. technical supervision during vacuum leakage testing;

7. technical supervision during bench testing.

6.2.45 Technical supervision during manufacturing of the refrigerating equipment shall be based on the applicable provisions of 6.2.1 to 6.2.39 and requirements of technical documentation approved by the River Register.

6.2.46 Testings as per 6.2.44.4 to 6.2.44.6 shall be based on the provisions 6.2.47 to 6.2.51.

6.2.47 The units operating under pressure of the refrigerant shall be hydraulically tested
by a test pressure equal to at least $1.5p$, where $p$ is the design pressure taken in accordance with 6.2.47, with the exception of reciprocating compressor crank cases for which a test pressure shall be not less than the design pressure.

The units operating under pressure of the liquid coolant or water shall be hydraulically tested by a test pressure of at least 1.5 of the working pressure but not less than 0.4 MPa.

**Table 6.2.47**

<table>
<thead>
<tr>
<th>Refrigerant group</th>
<th>Symbol</th>
<th>Chemical formula</th>
<th>Design pressure, MPa</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>R134a</td>
<td>C₂H₂F₄</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>R22</td>
<td>CHF₂Cl</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>R125*</td>
<td>C₆HF₆</td>
<td>2.0</td>
</tr>
<tr>
<td>II</td>
<td>R717</td>
<td>NH₃ (ammonia)</td>
<td>2.0</td>
</tr>
<tr>
<td>III</td>
<td>R290</td>
<td>C₃H₈ (propane)</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td>R1270</td>
<td>C₃H₆ (propylene)</td>
<td>2.0</td>
</tr>
</tbody>
</table>

**Table 6.2.47**

**6.2.48** The units operating under pressure of the refrigerant shall undergo pneumatic leakage tests by a test pressure equal to at least the design pressure taken in accordance with 6.2.47 with the exception of reciprocating compressor crank cases for which a test pressure shall be not less than 0.8 times the design pressure.

**6.2.49** The equipment operating under pressure below the atmospheric pressure shall undergo vacuum leakage tests at residual pressure not exceeding 0.8 kPa.

**6.2.50** Fittings in assembly and automation devices with stopping arrangements in addition to the above tests shall undergo pneumatic closing-tightness tests by a test pressure equal to the design pressure taken in accordance with 6.2.47.

**6.2.51** Compressors, refrigerant, liquid coolant and cooling water pumps, heat exchangers and other equipment, vessels operating under the refrigerant pressure, piping and fittings rated for 1.0 MPa and over, devices of automation, control and protection systems as well as devices for measuring and registration of temperature within refrigerating spaces after assembling shall be tested in accordance with the requirements of 6.2.28.

**6.2.52** Technical supervision during bench testings and refrigerating equipment inspection shall be based on requirements of 6.1.15 – 6.1.19, taking into account the following:

1. The bench for compressor testing shall ensure compressor operation with full refrigeration cycle using specified refrigerant, oil and keeping of the refrigerant nominal parameters and environmental conditions (cooling water temperature +32°C, ambient temperature +50°C);

2. Compressor type specimen testings shall be carried out at the rated power and idle run to determine refrigerating capacity, volume flow, power and oil consumption;

3. Compressors with incorporated motors shall be tested in regard to their starting characteristics, temperature and insulation resistance;

4. Standard compressor test time shall be at least 500 h, 150 h of which shall accrue to the operation at maximum pressure difference and other 150 h – at maximum power;

5. Refrigerant pumps shall be tested using specified refrigerant;

6. Refrigerant pump test time shall be sufficient to determine its specified characteristics, but not less than 8 h;

7. Heat exchangers (type specimens) operating under refrigerant pressure, shall undergo bench thermotechnical tests (the temperature of refrigerant measurement) using specified refrigerant and taking into account item structure and designation. Bench equipment shall ensure the item operation with full refrigeration cycle.

**Systems**

**6.2.53** Fittings of the piping shall be produced in accordance with the requirements of 10.3 and 10.4 of Part IV RCCS as per technical documentation approved by the River Register.
6.2.54 In the course of technical supervision during piping fitting manufacturing, the Surveyor shall control the following:

- compliance of material to the requirements of technical documentation;
- quality of finishing and lapping of the working and sealing surfaces;
- compliance of the springs, spool pieces, diaphragms used in fittings to the technical documentation requirements;
- results of hydraulic tests (see 6.2.57);
- adequate operation of local and remote drives of fittings;
- control, safety and measuring fittings as well as self-acting valves. The given fittings shall be checked in operation on bench to confirm their performance characteristics, specified in the technical documentation.

6.2.55 Checking of the hydraulic pressure results is designed to ensure the correctness of the test pressure chosen that, in case of fittings intended for a design pressure exceeding 0.1 MPa, shall be determined by the procedure specified in 6.2.28 relevant to testings of compressor components, pumps, fans operating under excessive pressure, and in the other cases shall be:

- at least 0.2 MPa – for fittings intended for a design pressure of 0.1 MPa and less, as well as for vacuum conditions;
- at least 0.3 MPa – for outboard valve box and ice box fittings;
- equal to the design pressure – for fittings assembled and being tested on leak tightness.

6.2.56 Type specimens of valves shall be additionally examined for at least 3 h under conditions of vibration, temperature and pressure limits, other special modes depending on fittings designation (checks for fire-resistance, nonflammability of inflammable mixture vapours, preventing the accidental admission of water, reliability at hydraulic impact, hydraulic resistance).

6.2.57 During manufacturing of pipelines of Classes I and II (see 10.1.2 of Part IV RCCS) and all steam, feeding, compressed air and fuel system pipelines with a design pressure over 0.35 MPa regardless of their class, the Surveyor shall carry out the technical supervision of pipelines hydraulic testings performed prior to insulation and application of coating, results of these tests shall be checked by the Surveyor as well. The correct choice of the test pressure that is considered to be of 1.5 of the design pressure, is also subject to the control.

The test excessive pressure of the pipelines of cargo pumping system intended for carriage of hazardous goods in bulk (except liquefied gases) shall be at least 1 MPa.

The test pressure for liquefied gas pipelines from the reservoirs to the pressure reducing valves shall be at least 2.5 MPa.

6.2.58 During manufacturing of the firefighting system pipelines and fittings, the Surveyor shall realize the technical supervision of hydraulic testings of such items, including checking of the results of hydraulic tests by test pressure corresponding to the Table 6.2.58.

When using the Table 6.2.58, the following shall be considered:

Assembled fittings shall undergo leakage test in closed position by pressure not less than 1.25p.

Valves of carbon dioxide reservoirs shall undergo tightness test by the maximal breakdown pressure of safety diaphragm.

Onboard systems shall be tested in the assembly after all installation operations have been finished.

6.2.59 The Surveyor shall control the recording in logbook of the hydraulic test results (see 6.1.8) with the indication of test pressure, numbers of certificates for pipes and data on welds testings.

6.2.60 Where it is impossible to carry out hydraulic tests of the pipelines prior to their installation onboard due to technical reasons, it is allowed to test separate pipe lengths, in particular, assembly joints.

6.2.61 Small bore pipes (less than 15 mm) of any class are not subject to testing by a test pressure.
Table 6.2.58
Test pressure during hydraulic testings of fire-fighting system pipelines and fittings

<table>
<thead>
<tr>
<th>Tested systems and assemblies</th>
<th>Test hydraulic pressure, MPa, during the tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>in a work-</td>
</tr>
<tr>
<td></td>
<td>shop</td>
</tr>
<tr>
<td>1. Foam and water extinguishing system piping</td>
<td>—</td>
</tr>
<tr>
<td>2. Carbon dioxide system:</td>
<td>—</td>
</tr>
<tr>
<td>.1 pipelines from reservoirs to starting valves; transit pipelines led via spaces</td>
<td>—</td>
</tr>
<tr>
<td>.2 pipelines from starting valves to nozzles</td>
<td>1,5p</td>
</tr>
<tr>
<td>3. Pneumatic pipelines</td>
<td>1,5p</td>
</tr>
<tr>
<td>4. Bottles, reservoirs, tanks</td>
<td>1,5p</td>
</tr>
<tr>
<td>.1 pressurized, including bottles without valves</td>
<td>Filled to the top of air vent</td>
</tr>
<tr>
<td>.2 non-pressurized</td>
<td>—</td>
</tr>
<tr>
<td>5. Valves</td>
<td>1p by air</td>
</tr>
</tbody>
</table>

Notes: 1. p — maximal working pressure in the system, for carbon dioxide system — design pressure in a bottle or reservoir, MPa.
2. Pipelines stated in 2.1 tested in the workshop by hydraulic pressure of 1.5p, may be tested on a ship by air with pressure of 1p.

6.3 TECHNICAL SUPERVISION DURING ONBOARD INSTALLATION AND TESTS

General requirements

6.3.1 Prior to onboard installation of the items the Surveyor shall verify the meeting the requirements of the Rules related to equipment of machinery spaces, control stations, arrangement of the passes, escape routes and ladders, free access for maintenance and repair of mechanisms, boilers, pipelines and fittings.

6.3.2 Prior to onboard installation, items are subject to a visual inspection. The Surveyor shall verify the following:

.1 availability and accuracy of supporting documentation, marks and stamps as per technical supervision form;
.2 integrity of the bench assembly of the onboard machinery item and supply completeness;
.3 compliance of foundations, their installation, arrangement and preparation of bearing surfaces with the approved technical documentation.

Internal combustion engines, gears, disengaging and elastic couplings

6.3.3 Installation and assembling of main engines, gear components and shafting components shall be carried out after accomplishment of all hull operations and testing for tightness of compartments and double-bottom tanks in the engine room area and the shaft line, including completion of foundation manufacturing.

6.3.4 During onboard installation of the main engine in dismantled condition, checks and technical supervision shall be carried out as per requirements of 6.2 including foundation preparation and base frame installation.

6.3.5 The installation of items shall be carried out in accordance with the approved technical documentation depending on their type and construction.

6.3.6 In the course of technical supervision during installation of gears and couplings, the following shall be checked:

.1 security of attachment of gearing cases to ship foundations;
.2 quality of installation of units and components used in torque transfer, on shafts.

6.3.7 Technical supervision during installation and testing of items driven by main engine shall be carried out at the same time as
technical supervision during installation and testing of main engines.

6.3.8 Once the installation operations are completed, items are subject to the inspection to check the quality of installation and its compliance with the detailed drawings approved by the River Register.

Shafting

6.3.9 The onboard installation of stern gear and shafting shall be carried out after completion of hull operations, including all operations related to foundations for main engines and shafting bearings, tests of compartments and tanks in the area of shafting and engine room, determination of the shafting theoretical axis.

6.3.10 Prior to stern gear and shafting installation all fixed loads that can cause deformation of the hull due to heavy weight, shall be placed and installed in their respective places, and change of hull position in the area of shafting and engine room shall not exceed ±3 mm relative to its position recorded at the beginning of operations.

6.3.11 In the course of technical supervision during installation of stern gear, the following shall be checked:

1. quality of the punching of shafting theoretical axis;
2. sizes, deviation from the shape and roughness of seatings and horn end faces, bosses, welded pad of after peak bulkhead, seatings of stern gear and bearing bushes;
3. compliance of mating surfaces setting with the drawing requirements;
4. forces for components pressing-in, security of their attachment and locking.

After installation, internal diameters are subject to the control measurement and stern tube bearings – to the inspection.

If stern tube was installed after watertightness test of the hull, corresponding hull compartment shall be tested again.

6.3.12 Prior to shafting installation the following shall be checked:

1. bearings foundations and bearing surface finish – deviations from flatness, roughness, thickness of foundation bearing plates;
2. propeller shaft through the visual examination and its documentation;
3. quality of propeller and half-coupling fitting to the propeller shaft;
4. clearances in stern tube and strut bearings by results of propeller shaft and bearing necks measurement.

6.3.13 After propeller shaft installation the following shall be checked:

1. clearances in bearings;
2. propeller shaft position in stern gear in axial direction;
3. quality of installation of stern seals or other stern gear sealings and gland packing laying.

6.3.14 Prior to propeller installation the following shall be checked:

1. availability of documentation and stamps;
2. surface soundness (by visual examination);
3. quality of preparation of hub bore mounting surface, tapered hub bore fitting-on;
4. keys fitting into keyed connection.

6.3.15 In the course of technical supervision during the installation of propeller or water-jet propeller rotors, the following shall be checked:

1. propeller axial shift in relation to the shaft;
2. pressing force and interference fit of connection;
3. uniformity and tight fitting of fairing nut to the hub and security of its locking;
4. tightening force and locking of the fastening elements of detachable blades;
5. clearances between the propeller blade and the nozzle or in the flow path of waterjet.

6.3.16 Prior to shafting installation and alignment the following shall be checked:

1. diameters of shaft journal and internal borings of bearing inserts by results of control measurement to determine clearances in bearings;
2 quality of rolling bearings installation on shafts;
3 shaft laying into bearings and bearings installation on foundation;
4 shafts mutual alignment relative to each other by control marks when connecting in the shop;
5 finish of fastening bolts and holes in the foundation and bearings.

6.3.17 Shafting shall be aligned in such a way as to prevent the exceeding of permissible values of shaft stress and bearing load at any ship loading condition and allowable wastage of shafts and bearings in operation.

6.3.18 The holes for flange connections bolts shall be treated jointly for both flanges of connected shafts by their actual dimensions, and bolt heads and nuts are to be checked for adequate contact with the flanges surface.

6.3.19 In the course of technical supervision during shafting installation and after assembling of all connections and securing of bearings, the following shall be checked:
1 shaft position in the bearings and fitting of support inserts to the shaft journals
2 clearances in the thrust bearing between the collar and segments, axial clearances between thrust collar and shafting fillets or bearing insert ends
3 fitting of chocks to the support branches of bearing bodies
4 finish of holes for templet bolts in the foundation and bearings
5 security of attachment and locking of bolts
6 crankshaft deflections of the main engine after its connection to the shafting

6.3.20 Final control of the shafting alignment shall be performed with the ship afloat after chocks fitting to the bearings, at displacement of at least 85% of the lightship displacement.

The Surveyor shall check the provided results of alignment parameters measurement (fractures and misalignment of the shaft axis), entered into the tables, indicating as well design and allowable values of these parameters.

6.3.21 Installation, assembling and control of fitting of the shaft turning gear, tachometer transmitter, shafting brake, devices for reducing power are to be performed as per technical documentation requirements approved by the River Register.

6.3.22 The Surveyor shall check the parameters of the main engine crankshaft alignment with the shafting or reduction gear simultaneously with or after shafting alignment. Measured values of parameters shall not exceed those specified in the manufacturer’s technical documentation on installation of such items. Deviations in frame straightness and crankshaft deflections shall not exceed the norms determined by the manufacturer of the engine.

6.3.23 The Surveyor is to verify that in the process of alignment of engine crankshaft and electric generators at their rigid connection (at main units on electric ships), allowances specified in the technical documentation of the generator manufacturer are kept, and in the process of alignment of propulsion electric motor armature shaft and thrust shaft are kept allowances determined by the propulsion electric motor manufacturer.

Compressors, pumps, fans and separators

6.3.24 The technical supervision during installation of compressors, pumps, fans and separators shall be performed as per approved technical documentation. Scope of technical supervision is to be determined taking into account type, designation and design of the item under technical supervision.

Boilers, heat exchangers and pressure vessels

6.3.25 Installation of boilers, heat exchangers and pressure vessels shall be carried out in accordance with the requirements of technical documentation on installation approved by the River Register. Prior to start the installation, it is important to ensure that assembly and welding of ship foundations are completed and items have a document issued by the QC service and confirming their applicability.
6.3.26 The Surveyor shall perform the internal survey of the boiler with standard valves and instruments after completion of the assembling, boiler installation on the foundation and fixing, but prior to application of insulation, shell and lining.

Heat exchangers internal survey shall to be performed by the manufacturer's QC service.

Pressure vessels internal survey shall to be performed by the Surveyor.

If the boiler is fully assembled (with insulation, shell and lining) and provided with supporting documents, only accessible parts are subject to internal survey.

6.3.27 During boiler internal survey, the Surveyor shall verify the following:

1. Boiler components and welds shall be free from damages and defects.
2. Hot-water, waterwall and down-take pipes shall not be deformed but free from plugs (verify by the means of master balls).
3. Water level indicators shall be installed relative to heating surface as per Rules requirements.
4. Drums and headers internal equipment shall correspond to the drawing and is fixed.
5. Fittings and instruments installed on the boiler shall correspond to the drawings.
6. Instruments shall be provided with documents on calibration by metrological organization.
7. Boiler drums and headers as well as superheaters headers shall be protected against direct heat flow.

6.3.28 Hydraulic leak test of boiler (with all pipelines, fittings and instruments) shall be carried out under test pressure as per standards of ГОСТ 22161, in the presence of the Surveyor after boiler installation on the ship.

Main steam piping, feeding pressure piping, blow-off pipes, water gauge instruments and all fittings are subject to the hydraulic test with the boiler.

If the boiler is fully assembled (with insulation, shell and lining) and provided with supporting documents confirming hydraulic tests performance, the boiler hydraulic test on board the ship is not required.

Onboard hydraulic test of the steam piping is obligatory.

6.3.29 Tested boiler shall be kept under test pressure for at least 5 to 10 min. During keeping under test pressure, the purge pump shall be disconnected and pressure in the boiler shall not decrease. Then, the pressure is decreasing to the working value and maintained constant to the completion of the examination.

6.3.30 The boiler shall be considered as having passed the test if no leaks or sweating of welds, leakage in pipe expanded connection, fitting connecting flanges, instrument connections as well as no local bulges, residual deformation or signs of any connection damage are detected.

6.3.31 Technical supervision during hydraulic leak tests, air test and outer survey of the pressure vessels with all fittings and system piping which contains the pressure vessels, shall be performed after onboard installation of the system. The hydraulic test shall be performed under a test pressure equal to 1.5 of operating pressure in the system.

6.3.32 After hydraulic test, pressure vessels are subject to air test (ГОСТ 22161) for working pressure to check the tightness of connections.

After testing and adjustment in accordance with the requirements of the Rules, safety valves shall be stamped by the manufacturer's QC service.

6.3.33 After onboard installation, the Surveyor performs technical supervision for boiler steam sample, taking into account the following:

1. Test duration is 4 to 8 h at steam working pressure.
2. Boiler steam is not consumed, all boiler valves are closed except blow-down valve of superheater header.
3. Water level in the boiler is maintained in a working range.
4. Boiler insulation and shell are removed in such a way as to ensure meeting the requirements of 6.3.34.
If the boiler is fully assembled (with insulation, shell and lining) and provided with manufacturer supporting documents on results the boiler steam sample, boiler steam sample after its onboard installation is not required.

After steam sample, the boiler is subject to mooring and running trials. Waste-heat boilers are tested during the operation of engines at mooring and running trials.

6.3.34 In the course of technical supervision during boiler steam sample the following shall be checked:

1. tightness of welding, riveted, threaded and expanded joints of the boiler, flange connections of fittings and steam pipelines
2. tightness of the boiler and boiler flues shell
3. presence and sizes of expansion clearances in the holes of boiler support on the foundation allowing thermal expansion of the boiler and clearances in the arrangements preventing displacement of the boiler
4. presence and parameters of thermal distortion of the boiler components

When the results of boiler test in steam are satisfactory and defects detected in the course of testing are eliminated, insulation and shell installation is to be carried out.

Refrigerating plants

6.3.35 Technical supervision during installation and testing of the refrigerating plant on transport, refrigerated and catching vessels shall be based on the applicable provisions of 6.3.1 to 6.3.33 taking into account the following:

1. Components and equipment of the refrigerating plant supplied to the shipyard are subject to the Surveyor’s check by certificates or documents of refrigerating equipment manufacturer;
2. Equipment and items manufactured by the shipyard, are subject to the check and testing prior to installation as per 6.2.44 to 6.2.53.

6.3.36 After completion of assembly-welding works on the hull but prior to insulation installation, leak testing of the refrigerating plant room is subject to the technical supervision, taking into account the following:

1. Test (excess) air pressure during leak testing is taken equal to 2 kPa;
2. compressed air pressure drop for 1 h shall not exceed 25% of the initial test pressure, i.e. 1 h after the pressure in the tested room shall be not less than 1.5 kPa.

6.3.37 In the course of technical supervision during the refrigerating plants installation, the Surveyor shall check the following:

1. meeting the requirements of the Rules on the control stations equipment and places of maintenance, arrangement of the passes, escape and emergency routes as well as their closures;
2. compliance of the refrigerant equipment arrangement (including control, monitoring, alarm and protection devices) with the requirements of the approved technical documentation
3. proper installation of pipelines and their reliable protection against damages;
4. fastening of the refrigerating equipment;
5. alignment of the refrigerating plant units;
6. quality of the insulation installation, including the type (brand) of insulating material, thickness and security of insulation attachment, quality of the insulation of installation assemblies in the area of framing, pipes passages, hatches and doors.

6.3.38 In the course of technical supervision during refrigerating plant systems manufacturing and installation, the Surveyor shall check:

1. quality of welded butt-joints of the refrigerant pipelines – using one of non-destructive testing methods.

Overlapped joint weld, on the backing rings and other which can not be checked by the non-destructive testing, shall be tested by the hydraulic pressure equal to 1.5 of the working pressure;

2. operation of isolation valves and refrigerant system pipelines after leakage testing of the system by stage-by-stage connection of
the system sections depending on the group of refrigeration consumers and pressure rise in these sections to 1.1 of working pressure;

3. penetrations of air cooling systems and ventilation ducts through watertight and fire protection structures;

4. arrangement of ventilation inlets and outlets, flame-breaking fittings on the ends of air channels and fans of non-sparking type in the explosion-hazardous spaces;

5. gas and air tightness of air channels before and after insulation operations;

6. insulation of air channels.

6.3.39 The refrigerant system shall be tested for leakage by the gaseous atmosphere test pressure equal to a working pressure (see 9.3.2 Part IV RCCS) for 18 h, after completion of installation. Total pressure drop caused by adsorption or leakage during the testing shall not exceed 2% of the initial test pressure.

In such testing shall be used dry air, carbon dioxide or nitrogen with the temperature of water vapor saturation up to 45°C.

After leak test, the pressure is to be relieved by sequential valves opening on the emergency drainage station to check the emergency drainage system of the refrigerant.

6.3.40 After passing the leakage tests the refrigerant system shall be drained and undergo vacuum leakage tests at residual pressure not exceeding 1 kPa.

6.3.41 In the course of technical supervision during the leak test of the refrigerant system it should be taken into account that all tests shall be performed for 12 h after vacuuming to the residual pressure up to 1 kPa.

The system is considered as passed the test if total pressure rise (due to steam-gas desorption and inrush of air in the course of testing) do not exceed 25% of the initial residual pressure.

When the leak testing is completed, the quality of drainage of the refrigerant system is to be checked.

The absolute water content after drainage according to the laboratory analysis data shall not exceed 0.15 g/m³.

6.3.42 Coolant and cooling water systems are subject to the leak test (see 6.2.48), being kept under working pressure for at least 1 hour.

6.3.43 Safety valves designed for refrigerating plant shall be checked and tested in the testing laboratory prior to their onboard installation, taking into account the following:

1. Valve is to be adjusted to blow at 1.1 to 1.2 of working pressure;

2. Valve is to be closed after actuation at a pressure of at least 0.85 of working pressure;

3. Valve trim tightness shall be checked by the immersing with secondary rise of pressure to the designed value after its closing upon actuation.

Systems

6.3.44 In the course of technical supervision during installation of systems and piping the following shall be checked:

1. complete set and compliance of the system's components with the requirements of the approved technical documentation;

2. quality of system's components cleaning and processing, corrosion-resistant coatings;

3. fact of performance and results of hydraulic tests of fittings, pipings, devices prior to their onboard installation;

4. proper arrangement and installation of pipings, fittings, instruments and automation equipment, compliance of the pipe bending radiuses with those specified by drawings;

5. completion of the assembling, welding and leak testing of hull structures as well as after installation of all the saturating welding parts;

6. reliable and proper installation of bottom and side valves and sacrificial protection components;

7. installation of standard gaskets, fasteners, security of pipes and compressors attachments;

8. availability and safety of maintenance and repair of pipelines and fittings;

9. availability of arrangements for draining or blow-down of the medium, absence of pos-
sible liquid stagnation areas, preventing of water hammers, presence of pipeline pitches;

10. providing with insulation, housings, barriers, protection against mechanical damages;

11. providing with identification plates on the fittings, identification pipelines painting, position indicators of shut-off devices, operation of local and remote drives, their accessibility;

12. arrangement and structure of branch suction and inlets;

13. safety of precautions against compartment flooding, hazardous and toxic gases and vapors penetration into accommodation and service spaces;

14. availability of grounding and (random) grounding check of electrically conductive plastic pipelines.

When the assembling is completed, the systems shall undergo hydraulic strength and leak tests (see 6.2.57) on board the ship or air test, if such alternative is provided by the Rules.

6.3.45 In the course of technical supervision during testing of systems metallic piping, the test pressure shall be taken considering provisions 6.2.57.

6.3.46 All pipelines after assembly shall undergo leak tests in operating conditions, except:

1. heating coils in tanks and oil and gas fuel lines that shall be tested by 1.5 \( p \), but not less than 0.4 MPa

2. liquefied gas pipelines that shall be leak tested (by air, haloids etc) by a test pressure chosen depending on the working pressure.

6.3.47 In case where hydraulic tests of assembled piping systems are carried out on board, leak tests and strength tests of them may be combined.

6.3.48 Testing of air, overflow and sounding pipes shall be carried out together with the tanks they are connected with.

6.3.49 Plastic pipelines making part of ship's systems that ensure the main purpose of the ship, its survivability and floodability, shall be tested after installation by hydraulic pressure at least 1.5 times exceeding the design system pressure.

6.3.50 Plastic pipelines not stated in 6.3.46 shall undergo leak test by the working pressure.

### 6.4 MOORING TRIALS

#### General requirements

6.4.1 The purpose of the mooring trials is to check the quality of installation and the adjustment of the items stated in 6.1.1, compliance of their parameters and characteristics with the specification and to state if the ship is ready for running trials.

6.4.2 Prior to start the mooring trials, all operations related to installation, running-in and adjustment of ship machinery, equipment and systems shall be completed and accepted by the manufacturer's QC service (organization responsible for conversion, modernization and repair). Items are subject to the mooring trials after preparation to their direct application together with systems and devices serving these items or containing them.

6.4.3 The mooring trials of the items in operation as intended shall be carried out on the standard equipment in modes and scopes specified by the test program methodology approved by the River Register.

6.4.4 Prior to start the mooring trials, the Surveyor shall verify that all operations related to installation, running-in and adjustment of ship machinery and systems components are completed.

For general provisions on technical supervision during mooring trials see 4.2.

6.4.5 In the course of the mooring trials the Surveyor performs the technical supervision on functional check of manual, remote and automatic control, locking devices, alarm system, protection, means of communication between the wheelhouse, the engine room and control stations.

6.4.6 In the course of technical supervision during the mooring trials, the recording of all
parameter values required by the test program methodology is subject to the checking.

6.4.7 If operation of components of ship machinery was forcibly interrupted during the functional checking, continuation of the mode, increase of its duration or recurrence shall be approved by the Surveyor considering the causes which led to the interruption.

Internal combustion engines

6.4.8 In the course of technical supervision during the engine trial, the following shall be checked:

- 1. operational readiness of units and systems serving engines;
- 2. engine starting and reversing characteristics as per Rules, adequacy of air receivers or battery capacity;
- 3. automatic control systems of rotation frequency and operation of limit switches;
- 4. engine parameters as per technical documentation.

6.4.9 Load modes and duration of mooring trials of main and auxiliary engines shall correspond to the Table 6.4.9. Duration of mooring trials of prototype ships engine at 100% mode increases twice compared to that established in the Table 6.4.9.

<table>
<thead>
<tr>
<th>Engine operated on</th>
<th>Trials duration (h), at engine output (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>propeller characteristic, torque</td>
</tr>
<tr>
<td></td>
<td>% of the rated value</td>
</tr>
<tr>
<td>—</td>
<td>Idle run</td>
</tr>
<tr>
<td>39</td>
<td>25</td>
</tr>
<tr>
<td>63</td>
<td>50</td>
</tr>
<tr>
<td>83</td>
<td>75</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>—</td>
<td>110</td>
</tr>
<tr>
<td>—</td>
<td></td>
</tr>
</tbody>
</table>

6.4.10 Parameters shall be measured at steady engine thermal state at least twice at each mode after completion of all transient processes.

Shafting, gears, disengaging and elastic couplings

6.4.11 Shafting, gears and couplings shall be tested while operating together with the main engine. In the course of technical supervision the Surveyor shall check:

- 1. temperature of journal and thrust bearings;
- 2. absence of hits in stern gear, gears and couplings, bearings;
- 3. vibration of engines, bearings and foundations;
- 4. effectiveness of the stern gear seals;
- 5. water supply to the sterntube.

Compressors, pumps, fans and separators

6.4.12 Compressors, pumps, fans and separators shall be tested together with units and systems they make part of.

In the course of technical supervision during these tests the following shall be checked:

- 1. possibility of control from a local, remote, emergency and secondary stations;
- 2. adequate operation of automation, alarm and protection means, possibility of controlling of the drive;
- 3. specified items parameters as per technical documentation;
- 4. efficiency of safety, relief, disengaging and breaking devices;
- 5. tightness of connections and pipelines;
- 6. forces on the handles of manual drives.

Systems

6.4.13 In the course of technical supervision during the testing of compressed air system and its serving compressors, the Surveyor shall check the following:

- 1. actuation of safety, reducing and starting quick closing valves and readings of pressure gauges;
- 2. duration of air receivers filling by the compressed air to required working pressure;
- 3. timeliness of automatic activation and deactivation of compressors, duration of their automatic purging during starting;
6.4 air output for typhoons and its operation;
5 state and operation of electric equipment and alarms indicating compressor operation in the radio room;
6 temperature of air fed to air receivers.

6.4.14 During the testing of the fuel system the following shall be checked:
1 operation stability of fuel priming pumps in the specified mode and remote disconnection possibility;
2 duration of daily service tanks filling;
3 alarm actuation of the minimum permissible fuel level in the tank;
4 technical condition and working efficiency of the electric equipment;
5 adequate operation of devices for remote closing of valves of daily service tanks and main tanks, as well as overflow pipes;
6 stable engine operation at their transferring from heavy fuel to diesel and back;
7 adequate operation of the heavy fuel preparation system (separators, filters, heaters, automatic maintaining of preset fuel temperature).

6.4.15 In the course of technical supervision during the testing of oil system, the Surveyor shall check in operation the system of remote control from the wheelhouse of engine oil circulation, thermostats and oil transfer pumps, system of main engines oil circulation with the hand pump and the mechanically-driven pump (from the local control station or from the central control station).

6.4.16 During the testing of the cooling system the following shall be checked:
1 water temperature at the inlet and outlet of coolers and engines;
2 water supply for cooling compressors of exhaust gas pipe and stern unit;
3 adequate operation of the device for automatic control of the cooling water temperature;
4 possibility to switch the inner cooling circuit over to overboard water or standby;
5 alarm actuation of the minimum water flow in the inner cooling cycle expansion tank.

6.4.17 During the testing of the ship system in operation the following shall be checked:
1 capability of being operated as prescribed by technical documents;
2 proper operation of fittings, their drives, safety and relief valves;
3 tightness of connections;
4 accuracy of readings of standard instruments and automation equipment;
5 absence of abnormal vibrations, heating, noise;
6 meeting special requirements due to system purpose and covered by the Rules.

Boilers, heat exchangers and pressure vessels

6.4.18 During mooring trials steam boilers, heat exchangers and pressure vessels shall be checked as per program approved by the River Register.

6.4.19 Readiness of the steam boiler for mooring trial shall be confirmed by the document of the shipyard's QC service.

6.4.20 During mooring trials of the steam boiler the following shall be checked:
1 operation of the fuel system, including oil-fuel priming pump, filters, fittings, fuel heaters, filling of daily fuel service tank;
2 operation of nozzles and quality of burning (visually);
3 operation of the feed and condensate system: feeding pump, filters, fittings, quality of condensate in the hot well and observation tanks, and water treating quality;
4 operation of fans, gate valves, air channel density;
5 tightness of the boiler and boiler flues casing;
6 operation of automation equipment;
7 operation of electrical equipment;
8 amplitude and vibration frequency of the boiler and its components.

6.4.21 The boiler is to be tested in all modes provided in the operating manual and test program. Tests of self-contained boilers during mooring trials are final.
6.4.22 Results of tests in steam of the boiler and steam piping shall be recorded in the report of initial survey of the ship.

6.4.23 Visual inspection of boilers with fittings, equipment, pumps, filters, heat exchangers, pipings and other system components shall be carried out in steam under working pressure.

6.4.24 During visual inspection of the boiler, the following shall be checked:

1. Water level in the boiler by purging sight glass channels with steam and water, and purging of control cocks;
2. Proper appliance of mark on the cock plug of the boiler pressure gauge;
3. Serviceability of water level indicators;
4. Seal or stamp (indicating the calibration period) on the pressure gauges and red line on the pressure gauge scale;
5. Serviceability of remote drives of steam pipeline shut-off valves, fuel and lock valves;
6. Actuation of blow-down and scum valves of the boiler;
7. Safety valves adjustment, herewith, firstly on the boiler with superheater shall be activated the superheater safety valve and when pressure continue to rise – saturated steam safety valves installed on the boiler. The adjustment of safety valves shall be checked under manual boiler control;
8. Serviceability of manual drives of safety valves actuation from the boiler room and outside;
9. Serviceability of feeding devices (pumps, pipelines and fittings);
10. Proper operation of boiler’s automation equipment, emergency alarm and protection;
11. Constancy of boiler performance while switching from automatic control to manual and back;
12. Absence of leakage, steaming and buckling in the flame sections accessible for examination, condition of furnace brickwork, serviceability of furnace door locking devices;
13. Overall condition of fuel storage and their air pipes, pipelines, fuel pumps, nozzles;
14. Quality of boiler and steam pipes insulation.

When the results of safety valves adjustment are satisfactory, one of valves installed directly on the boiler shall be stamped by a representative of the shipyard’s QC service.

6.4.25 Heat exchangers in operation shall be checked together with serviced systems, piping and devices to check the quality of their installation and operational reliability. The following shall be checked:

1. Operation on specified parameters of the working medium;
2. Serviceability of fittings, instruments and control devices;
3. Adjustment of safety and alarm and protection devices;
4. Fastening and design of arrangements compensating thermal expansion.

6.4.26 To check the quality of installation of the pressure vessels and their applicability as intended, they shall be tested as a part of ship systems under working pressure. The following shall be checked:

1. Serviceability of fittings, instruments and control devices;
2. Adjustment of safety devices, sealing of safety valves;
3. Functioning of arrangements for moisture removal from the vessel;
4. Seal or stamp on the pressure gauges (indicating the calibration period) and red line on the pressure gauge scale indicating permissible pressure.

**Refrigerating plants**

6.4.27 Testings of refrigerating plant in operation purposes to verify its operational efficiency on board, as well as plant reliability and safety.

6.4.28 The refrigerating plant in operation shall be tested in the presence of the Surveyor as per program approved by the River Register. All items of the refrigerating plant shall be checked both in automatic and emergency manual operation.
6.4.29 In the course of technical supervision during refrigerating plant testing the following shall be checked:

.1 proper operation of the main and standby refrigerating equipment (compressors, separators, apparatuses, systems, heating controllers, instruments, shut-off and control valves, warning alarm and protection systems, remote control), and serviceability of electrical and automation equipment, systems servicing the refrigerating plant room and refrigerated spaces

.2 possibility to achieve the lowest specified temperature in the cooled spaces and time required for that

.3 possibility to maintain the specified temperature in the cooled spaces for 24 h connecting at regular intervals standby equipment under condition of its continuous operation for 10 to 12 h. In this case the refrigerating capacity of lead ships shall be determined as well

.4 insulation efficiency by mean heat transfer coefficient and dynamic of air temperature change when the refrigerating plant (of lead ships) is not in operation during 24 h

6.4.30 In the case of refrigerating plant testing at a boiling and condensing temperature of the refrigerant different from designed ones by more than 1 °C (boiling temperature) or than 2°C (condensing temperature), the refrigerating capacity shall be re-evaluated for design conditions.

6.4.31 The refrigerating capacity and mean heat transfer coefficient are considered to be confirmed if their difference from the designed values do not exceed 5%.

6.4.32 The processed results of the refrigerating plant tests shall be submitted to the Surveyor for drawing up the River Register documents.

The conclusion about compliance of the plant characteristics and its equipment with specification shall be attached to the test report documentation for the plant in operation.

6.5 RUNNING TRIALS

6.5.1 Running trials are intended for complete functional check of the power plant and systems in operating conditions.

6.5.2 Running trials shall be performed after eliminating defects detected during mooring trials as per the program approved by the River Register. The running trials program provides for checking all the parameters prescribed by the vessel's specification and technical documentation for ship machinery or similar technical documentation.

6.5.3 Load modes and operation period of the main engines in these modes during running trials shall comply with those in Table 6.5.3. Running trials duration for engines of the lead ships at 100% mode increases twice compared to that established in the Table 6.5.3.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Rotation speed</th>
<th>% of the rated value for engine operating as per characteristic</th>
<th>Test duration (h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minimum steady rotation speed mode</td>
<td>not standardized</td>
<td>0.25</td>
</tr>
<tr>
<td>2</td>
<td>Modes of operation under load</td>
<td>63</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>80</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>91</td>
<td>75</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>103</td>
<td>110</td>
</tr>
<tr>
<td>7</td>
<td>Mode corresponding to the astern running rating</td>
<td>not standardized</td>
<td>0.50</td>
</tr>
</tbody>
</table>

During running trials, diesel generators shall be checked in operation as intended.

6.5.4 Boilers, heat exchangers, compressors, pumps, fans, separators, pressure vessels, refrigerating plants, general systems and systems of the ship's power plant shall be checked in operation during running trials as intended.

6.5.5 After running trials, steam boilers shall be submitted for internal survey.
The Surveyor shall be submitted the measurement results of flame tubes performed by the shipyard’s QC service after mooring and running trials, to compare them with the measurement results obtained when manufacturing the boiler in the shop, or specified in the technical documentation.

6.5.6 Deck machinery shall be tested together with their devices in modes provided by the test program approved by the River Register.

6.5.7 In cases provided by the Rules, during running trials they measure torsional vibration parameters of the shafting as per the separate program approved by the River Register.

Measurements shall be performed in propeller characteristic modes from minimum stable to maximum rotation frequency.

If a prohibited zone of rotation frequencies was found, numerical values of its boundaries shall be fixed in the ship datasheet, and prohibited zones on tachometer scales shall be marked according to 6.4.3 Part IV of RCSS. Availability of prohibited zones shall be fixed in the Certificate (PP-1.0 form) issued on board the ship.

6.5.8 In case of failure of boilers, heat exchangers and pressure vessels during technical supervision of their functional check during mooring trials, after remedying them, they perform technical supervision of boilers as per 6.4.18 to 6.4.25, heat exchangers and pressure vessels – as per 6.4.26 to 6.4.28. During running trials, waste heat boilers shall be tested as per 6.4.21 to 6.4.24.

6.5.9 In case of failure of refrigerating plants during technical supervision of their functional check during mooring trials, after remedying them, they perform technical supervision of refrigerating plants as per 6.3.44 to 6.3.49 during running trials. When testing, all the circuits of refrigerating plants shall be used. Refrigerating plant elements shall be checked both in automatic and emergency (manual) mode.
7 SHIP ARRANGEMENTS AND OUTFIT

7.1 GENERAL REQUIREMENTS

7.1.1 This section contains the requirements for the technical supervision during manufacture of ship arrangements, equipment and outfit and during installation and testing of the above items onboard according to the Nomenclature.

7.1.2 Materials to be used for manufacture of items shall comply with the requirements of Part V and Part X of RCCS.

7.1.3 The technical supervision during manufacture and testing of steering engines, steerable thrusters, transverse thrusters and deck machinery (windlasses, capstans, and anchor, mooring, towing and boat winches) shall consider the applicable requirements set out in 6 of these Rules.

7.1.4 When conducting the technical supervision during manufacture of deck machinery, cargo handling gears and their assemblies, follow 6 of these Rules.

7.2 TECHNICAL SUPERVISION DURING MANUFACTURE

Rudder and steering gear

7.2.2 When parts of rudder and steering gear, transverse thrusters and steerable thrusters are visually inspected, the following shall be checked in addition to the list in 7.2.1:

.1 assemblage of rudder (nozzle), quality of key slots;
.2 protection of internal cavities of items from corrosion or their fill-up;
.3 quality of machining of holes for tight fit bolts;
.4 installation of plugs and drain plugs on hollow structures of rudders and steerable nozzles after filling them up with inert mass.

Anchor arrangement

7.2.3 When anchors are inspected, the following shall be checked in addition to the list in 7.2.1:

.1 documents on drop tests;
.2 quality of welding of welded anchors;
.3 curvature of anchor shank;
.4 weight of anchor.

7.2.4 The technical supervision during manufacture of anchor chains and their component parts includes the following:

.1 check of documents on materials to be used;
.2 check of documents on accessories (for chains);
.3 visual inspection for compliance of dimensions (for chains);
.4 review of test results;
.5 check of marking;
.6 branding.
Coupling arrangement

7.2.5 For type approval, standard samples of coupling equipment shall be bench-tested by test load with strain-gauging of critical parts as per the program agreed upon with the River Register.

Values of test load and permissible stresses in the coupling equipment parts are specified in Part V of RCCS.

7.2.6 When conducting the technical supervision during manufacture of series-produced coupling equipment, check the following:

1. compliance of workmanship of main parts and coupling equipment as a whole with technical documentation for manufacture;
2. kinematics and interaction of all parts, opening of lock under design load and strength of lock under bench test with test load (without strain-gauging).

Load-handling device

7.2.7 When conducting the technical supervision during manufacture of cargo handling gears to be installed on ships to be classified by the River Register, check the following:

1. quality of parent and welding materials used to manufacture metal structures and compliance of the same with technical documentation agreed upon with the River Register;
2. availability of necessary documents for component parts as per the Nomenclature;
3. workmanship of parts and assemblies and quality of assemblage of cargo handling gear according to the List;
4. correctness of bench testing of assembled removable parts of cargo handling gear as per 7.2.9 to 7.2.11 as per the program agreed upon with the River Register.

7.2.8 Tested cargo handling gears shall be branded according to 6.17 Part V of RCCS.

7.2.9 All newly manufactured removable parts of cargo handling gears (blocks, hooks, chains, turnbuckles, rope sockets, etc.) shall be tested with test load under supervision of person competent for conducting this type of tests. This test shall be performed on the properly calibrated machine or by suspending a load of specified weight to parts under test according to Table 7.2.9.

The proof load shall be applied statically. The time of keeping the upper structure under the load is at least 5 min.

<table>
<thead>
<tr>
<th>Weight of loads for testing removable parts of cargo handling gears under test load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removable parts</td>
</tr>
<tr>
<td>Chains, shanks, shackles, hooks, etc.</td>
</tr>
<tr>
<td>Single-sheave blocks without hoist cable bitter end attached to them</td>
</tr>
<tr>
<td>Single-sheave blocks with hoist cable bitter end attached to them</td>
</tr>
<tr>
<td>Multi-sheave blocks</td>
</tr>
<tr>
<td>$25 &lt; m_{SWL} \leq 160$</td>
</tr>
<tr>
<td>$m_{SWL} &gt; 160$</td>
</tr>
</tbody>
</table>

On completion of test, all parts shall be visually inspected for absence of defects or residual deformations. Blocks shall be disassembled for visual inspection of axles and sheaves.

All removable parts shall be submitted for visual inspection and tests with corrosion-resistant coat applied (except for paint coat).

Tested parts shall be branded according to the Nomenclature.

7.2.10 If removable parts of cargo handling gear are jointed in an assembly, test shall be applied to this assembly.

When this takes place, removable parts shall not be tested individually.

7.2.11 Standard samples of removable parts shall be tested with limit load equal to double test load within time specified by the manufacturer in the testing program.

Removable parts of cranes with lifting capacity of 100 t are not tested with limit load if
calculations and results of testing with test load have confirmed their strength.

Quantity of parts from a batch subject to this test shall be determined upon agreement with the River Register.

Sleeves and compression clamps for terminating wire ropes and thimbles shall be tested together with terminated rope.

A part is considered to have passed the test if it is not broken under limit load.

Parts tested with limit load shall not be repaired and used for the purpose specified.

Tests with limit load shall be witnessed by the surveyor. Test results shall be recorded in the report (see 2.3.12).

Hydrofoil system

7.2.12 When conducting technical supervision during manufacture of hydrofoil system, check the following in addition to the list in 7.2.1:

.1 assemblage of hydrofoil system;
.2 protection of internal cavities of items from corrosion or their fill-up;
.3 fitting of plugs and drain plugs on hollow structures of hydrofoil system.

Deck machinery

7.2.13 When conducting the technical supervision during manufacture of deck machinery parts operated under excessive pressure, check results of hydraulic tests performed after final machining before application of protective coats. Hydraulic test pressure \( p_{\text{test}} \) (MPa) for such tests shall be determined in accordance with the requirements of 6.2.28 imposed to test pressure for hydraulic tests of parts of compressors, pumps and fans operated under overpressure.

7.2.14 Parts and assemblies of deck machinery (bodies of reduction gears, trays, etc.) to be filled with petroleum products or their vapours under hydrostatic or atmospheric pressure shall be subject to tightness testing with dye penetrant method. In welded structures it is sufficient to test only tightness of welds.

7.2.15 After assembled, adjusted and run in and before installed onboard, deck machinery shall be bench-tested under load according to the program agreed upon with the River Register (according to Part V of RCCS).

Bench tests may be replaced with onboard tests.

Hydraulic drives

7.2.16 The elements of hydraulic drives being under load shall be strength-checked for the application of forces corresponding to the working pressure, here, the equivalent stresses in the elements shall not exceed 0.4 of the yield point of the element.

Life-saving appliances

7.2.17 The technical supervision during manufacture lifeboats, liferafts, life-saving apparatuses, lifebuoys and lifejackets shall be conducted in accordance with the requirements of 7.2.1.

Standard samples of life-saving appliances shall be tested according to the testing program agreed upon with the River Register and guidelines stated in Appendix 13.

Signal means

7.2.18 Standard samples of pyrotechnic signal means shall be tested according to the testing program agreed upon with the River Register and guidelines stated in Appendix 14.

7.2.19 When conducting the technical supervision for navigation lights, check the following in addition to the list in 7.2.1:

.1 interchangeability of parts;
.2 degree of protection (see Appendix 15);
.3 insulation breakdown strength (see Appendix 15);
.4 insulation resistance (see Appendix 15).

7.2.20 Bench tests of standard samples of lights, except for those mentioned in 7.2.18, shall be performed as per the agreed testing program developed according to Appendix 15 and shall include the following:

.1 functional tests;
.2 vibration survival, vibration resistance and on impact tests;
.3 operation check at high and low ambient temperatures;
.4 check for corrosion resistance;
.5 check for heat resistance;
.6 check for moisture resistance;
.7 operation check under roll and pitch;
.8 check of degree of protection from contact with current carrying parts;
.9 lighting tests.

**Ropes**

7.2.21 The technical supervision during manufacture of wire, synthetic and natural fiber ropes consists in:
.1 check of materials to be used for manufacture of products as per accompanying documentation;
.2 review of results of tests performed as per the agreed testing program;
.3 visual inspection and measurement.

**7.3 TECHNICAL SUPERVISION DURING ONBOARD INSTALLATION AND TESTS**

**Rudder and steering gear**

7.3.1 On completion of installation of rudder and steering gear and thrusters, the surveyor shall check the following:
.1 certificates for chains and ropes, reports on hydraulic test of hydraulic system;
.2 reliable installation and fastening of main steering drive on ship’s foundation;
.3 correct application of gauge-marks of rudder (nozzle) midposition, correct graduation of rudder (nozzle) position indicator at quadrant;
.4 drive alignment;
.5 quality of installation of rudder stock bearings;
.6 correct fit of steering drive support surfaces to gaskets, gaskets to foundation support parts and heads of foundation bolts and nuts to drive surfaces and foundation flanges;
.7 tightness of joints of hydraulic system pipelines of rudder and steering gear and thrusters;
.8 ease of turn of rudder blade or steerable nozzle with drive disconnected;
.9 mounting connections of rudder stock with rudder blade or steerable nozzle, availability of River Register brand on rudder stock if provided for by the Nomenclature;
.10 installation of side stops of steering drive;
.11 sealing gland of rudder stock and impermeability of seal of tapered joints;
.12 installation and fastening of stand-by steering drive;
.13 clearances in hinges and bearings;
.14 clearances that regulate rudder or nozzle movement in axial direction (upwards) depending on steering drive design;
.15 availability of locking devices that eliminate loosening of moving parts of gear;
.16 rudder or steerable nozzle angles to contact with turn limiter on hull and size of contact surface area;
.17 compliance of indications of rudder indicators with position of rudders or nozzles.

7.3.2 During harbour acceptance trials of rudder and steering gear, the following shall be checked:
.1 operability of gear with drive from power source by continuous rudder or nozzle deflection from hard over to hard over during 30 minutes;
.2 possibility of gear operation from emergency power source during 15 minutes;
.3 time of rudder or nozzle deflection from hard over to hard over and from mid-position to port and starboard separately with power supplied from main and emergency power sources. When main engine is used as a drive for hydraulic pump of steering gear, time of rudder deflection shall be measured in slow and full speed modes;
.4 reliability of switching from main drive to standby one and back at least three times and at different positions of rudder or nozzle;
.5 operability of gear with stand-by drive by deflecting rudder or nozzle from hard over to hard over, time of turn from 20° at a side to 20° at another side and number of people required for this operation;
.6 operability of steering engine limiters and quadrant turn angle;
.7 operability of communication means of control positions and rudder indicators;
.8 temperature of steering engine bearings, reduction gears and other parts;
.9 rudder or nozzle deflection by means of tiller (steering tackles).

7.3.3 When conducting the technical supervision during harbour acceptance trials of transverse thruster, check the following:
.1 operation of thruster during 30 minutes;
.2 thrust of thruster by method of direct measurements in alternate operation to starboard and port side (on lead ships);
.3 correct operation of signalling system in wheelhouse.

7.3.4 Running trials of rudder and steering gear of lead ships shall be performed simultaneously with check of maneuvering capabilities of loaded and light ship at design draughts and of tug boats and pushboats without convoys and with convoys.

7.3.5 During running trials of rudder and steering gear of ships mentioned in 7.3.4, the following shall be checked:
.1 no-failure rudder (nozzle) deflection from hard over to hard over and from any arbitrary position to a side or along centreline at full, mean and slow speeds ahead and astern;
.2 no-failure operation of gear in ship seaworthiness test modes;
.3 time of rudder or nozzle deflection from hard over to hard over and from centreline to each side at full and slow speed ahead (for electric power drive with power supply from main and emergency power sources);
.4 operability of test lamps, limit switches and overload alarm;
.5 indications of rudder indicators and their compliance with rudder blade or nozzle positions;
.6 force applied to hand drive wheel;
.7 force applied to water-jet propeller reversing handle;
.8 reliability and ease of changeover from main drive to standby one and back at different ship speeds and different deflection angles of rudders or nozzles.

7.3.6 Rudder and steering gear on series-produced ships shall be tested in accordance with 7.3.5.1 and 7.3.5.3 to 7.3.5.5.

**Anchor arrangement**

7.3.7 On completion of installation of anchor arrangement, the surveyor shall check the following:
.1 installation and fastening of windlass or anchor capstans on ship foundation;
.2 installation and fastening of anchor arrangement stoppers on ship foundation;
.3 mounting of anchor chains — i.e. assembly of coupling links;
.4 equipment of chain lockers;
.5 installation of devices for fastening and unfastening of bitter ends of anchor chains;
.6 assembled anchor chains and anchors for compliance with drawings, including availability of brands and compliance of assemblies and parts as per certificates;
.7 sizes of welds of foundations for elements of anchor arrangements;
.8 absence of angular misalignments of anchor chain in plan view;
.9 installation of remote control system equipment.

7.3.8 During harbour acceptance trials, anchor arrangement shall be checked in operation by alternately hauling out several shots of each chain and hauling them in by means of electric power drive and hand drive.

The following shall be checked during trials:
.1 correctness of running of chain links on sprocket wheels, through stoppers and anchor hawses;
.2 operability of stoppers and belt brakes of windlass, capstan or anchor winch (two or three break operations while chain or rope is hauled out);
.3 free run-out and run-in of chain and anchor from/to hawsehole and contact of anchor flukes with ship side;
reliability and rapidity of anchor release when sprocket wheels are disengaged from windlass shaft;
.tightness of closed hawse and chain pipes;
.no-failure operation of remote anchor release device;
.compliance of anchor chain hauling speed with mechanism ratings;
.self-stowage of all hauled anchor chain in chain locker.

During running trials on lead ships and convoys, anchor arrangement capability of providing safe anchorage and safe operation in navigation areas specified in the preliminary specifications.

The following shall be checked:
.sufficiency of holding power of anchors to hold a single ship or a pushboat with convoy on current;
.operability of anchor arrangement when hoisting anchors from design anchorage depths.

Operation of anchor arrangements on series-produced ships shall be checked at maximum depths of test area, as well as on river under current conditions.

When bow anchor arrangement is tested, the following shall be checked:
.operability of belt brakes with dead drive by breaking an anchor chain or an anchor cable being hauled out;
.operability of deck stoppers;
.capability of hauling in each anchor by means of windlass with lifting it off the ground and hoisting speed;
.capability of releasing both anchors by means of windlass with drive operating in all design operating modes;
.capability of simultaneous hoisting of two hanging anchors and hoisting speed;
.no-failure operation of remote anchor release device from wheelhouse;
.operability of hand drive of windlass or anchor winch;
.correct run of anchor chain links on windlass sprockets, through stoppers and hawses during all types of tests and correct run of anchor cable through cable layer.

When stern anchor arrangement is tested, the following shall be checked:
.reliability of anchor release with anchor; arrangement drive disabled by brake;
.capability of anchor release, lift-off from ground and hauling in by means of anchor handling gear and hauling speed;
.operability of remote anchor release device.

Towing and coupling arrangements

On completion of installation of towing arrangement, the surveyor shall check the following:
installation and fastening of towing winches on foundation;
.compliance of type, diameter or circumference and length of towing rope with drawing or list;
.adjustment of mechanical lock of towing hook;
.correct installation of towing rope limiters;
.operability of remote towing rope release device at all possible angles of deviation from centreline;
.arrangement and design of guide rollers and blocks, no slipping off of rope or friction of rope against hull structures.

During harbour acceptance trials of towing arrangement, the following shall be checked:
.movability of towing hook with rope attached to it;
.capability of free release of towing rope from hook;
.correct operation of remote rope release device from wheelhouse;
.correct operation of towing winch during rope hauling in/out;
.operability of towing winch mechanisms and brakes.

During harbour acceptance trials of lead tugboats and pushboats with convoy, the following shall be checked:
7.3.16 On completion of installation of coupling arrangement, the surveyor shall check the following:

1. availability of coupling equipment;
2. safe attachment of coupling equipment to foundation;
3. availability of ship hull reinforcement at coupling equipment location.

7.3.17 During harbour acceptance trials of coupling arrangement, the following shall be checked:

1. correct operation of luffing mechanism;
2. correct operation of claws and locking hooks;
3. operability of head cams by turning them with a winch and returning them with springs;
4. correct operation of pressure shanks for two-locked couplings;
5. correct operation of winch when lock is lifted and lowered throughout height of stop;
6. correct operation of lock holder and release;
7. correct operation of lock key and rope coupling sea-securing device;
8. tensioning of ropes with tensioning station;
9. operability of rope shortening device.

On completion of operability check of mechanisms, test convoys shall be checked during running trials by direct measurement of stresses or forces that occur in coupling and uncoupling shall be performed, and operation of devices preventing spontaneous unlocking shall be checked. Unlocking shall be performed from local and remote control posts.

Test coupling and uncoupling of coupling arrangement of pushboats and bow locks of nonself-propelled ships may be performed on benches that simulate aft end of barge.

Strength characteristics of coupling arrangement on lead ships and arrangement.

Mooring arrangement

7.3.18 On completion of installation of mooring arrangement, the following shall be checked:

1. installation and fastening of mooring capstans or winches and other equipment of mooring arrangement on foundations;
2. positional relationship and height of installation of mooring arrangement components and availability of free areas and approaches to them;
3. compliance of type, circumference and length of mooring ropes with drawing instructions (list of supply);
4. quality of mounting of hydraulic system pipelines and pumps.

Load-handling device

7.3.19 On completion of installation and testing of cargo handling gear, preliminary tests of all units idling shall be performed. If results of preliminary tests are satisfactory, cargo handling gear with appropriate documentation shall be submitted to the surveyor for final trials.

7.3.20 Before onboard testing of cargo handling gear, the surveyor shall check the following documents:

1. notification on acceptance and readiness of gear for testing;
2. data sheet or certificate (for cranes);
3. testing program;
4. certificates for chains, ropes, removable parts of cargo handling gear, materials of critical parts of machines, metal parts of cranes, spars and welding materials;
5. reports of quality test of welded joints and information on certification of welders who performed critical welding;
6. data sheets for mechanisms and units;
7. specification for cargo handling gear;
8. drawings and diagrams.

7.3.21 Before tests begin, the surveyor shall visually inspect the cargo handling gear to check the following:

1. safe fastening of units to foundations and foundations to deck;
.2 correct assemblage of cargo handling gear;
.3 convenience of location of control posts;
.4 safe stowage of rope on drum;
.5 availability of safety devices, safety guards and fences.

7.3.22 Cargo handling gear installed onboard shall undergo static and dynamic tests with test load.

Dynamometer shall not be used instead of test load.
Luffing cranes shall lift a test load with maximum and minimum overhangs. If luffing cranes have variable outreach-dependent lifting capacity, they shall lift a test load at maximum and minimum overhangs for each fixed lifting capacity.
Lifting capacity limiter shall be off for testing with test load.

7.3.23 For static test of crane, a test load weighing 125% of nominal capacity shall be used. Here, crane beam shall be in a position corresponding to least crane stability, and load shall be lifted to height of 100 to 200 mm. Test load shall be retained by crane in fixed position for at least 10 minutes.
For dynamic test of crane, a test load weighing 110% of nominal capacity shall be used. All motions shall be performed at full speed.
Luffing during tests shall be carried in all range of possible outreach values between two permissible extreme positions of beam.
Reliable operation of brakes of cargo winches of beams and cranes shall be checked by quickly lowering a test load by about 3 m and abruptly braking it. This test shall be performed in at least two positions of beam.
Test load hanging with dead winch drive shall be checked too.

7.3.24 After tested with test load, crane shall be tested with a load equal to lifting capacity with hoisting, turning, luffing and travelling mechanisms operating at maximum speed. When this takes place, abrupt braking shall be applied to test operation of brakes of hoisting, turning, luffing and travelling mechanisms.
Operation of limit switches and outreach indicators shall also be checked.
If crane is capable of making different simultaneous motions (hoisting, luffing, turning and travelling), all permissible combinations of motions shall be checked.
Lifting capacity limiters shall be checked in operation by lifting a load corresponding to limiter setting.

7.3.25 While crane is tested, condition of steel structures, beams, mechanisms, critical parts and fastenings shall be monitored.
Special attention shall be paid to crane stability, uniform contact bottom parts of all supports with base and fastening and operation of counterbalance weight and braking device.
Ensure that at least 1.5 rope coils remains on winch drum at lowermost working position of load-handling device.

7.3.26 When testing travelling cranes, ensure that travelling roller do not separate from rails.

7.3.27 After tests, all metal structures, units and parts of cargo handling gear shall be visually inspected by the surveyor to detect possible defects.
If defects are detected, their causes shall be eliminated, defects shall be remedied by methods agreed upon with the River Register, and retests shall be performed.

7.3.28 If results of cargo handling gear tests are positive, the River Register documents shall be drawn up.

Boat handling gear and life-saving appliances

7.3.29 After installed onboard, each boat handling gear shall be tested with a boat being lowered and lifted. The load shall be in accordance with Part V of RCCS.

7.3.30 Before boat handling gear tests with test load begin, assembled launching arrangements shall be inspected. The surveyor shall check the following:
7 Ship Arrangements and Outfit

7.3.31 When boat handling gear is tested, the following shall be checked:
.1 quality of mounting and complete set of launching arrangements;
.2 availability of brands and markings of items, assembles and parts and their compliance with submitted certificates;
.3 tightening of fastening screws, close fit of bed frame feet to foundations, quality of welds of foundations and reinforcements under foundations;
.4 reliable attachment of ends of boat falls on winch drums and of bitter ends of boat falls;
.5 boat davit outreach;
.6 possibility of observing the boat being lifted and lowered from winch control post;
.7 correct operation of hand drive of boat davit winches and screw drive of collapsible boat davits.

7.3.32 Swinging arms of boat davits shall be tested by swinging out and swinging in arms and boat davits and lowering and lifting a boat with cargo equal to weight of complete set of outfit and launching team several times (not less than three times). The following shall be checked:
.1 smooth movement of arms of boat davits;
.2 smooth movement of travelling rollers on guides of roll-down boat davits;
.3 force applied to hand drive handle;
.4 automatic cut-off (blocking) of power supply of electric drive when hand drive is activated (hand drive handle is attached);
.5 availability and adjustment of limit switches.

7.3.33 Mechanically driven life-boats and motor boats shall be tested underway to check drive and (or) motor in operation. If radio equipment, navigation equipment, floodlights, sprinkling system and compressed air system (on tanker boats) are available, they shall be tested for intended use.

7.3.34 When liferafts are installed, compliance of type, quantity, holding capacity, location, brands and markings of liferafts with requirements of agreed technical documentation and availability of River Register certificates shall be checked.

7.3.35 The surveyor shall check compliance of quantity, location and fastening of life-saving devices on vessel with requirements of technical documentation agreed upon with the River Register, availability of River Register certificates and manufacturer documents, as well as operability and completeness of life-saving devices.

7.3.36 Lifejackets shall be visually inspected and checked for compliance with manufacturer documents and River Register certificates.

7.3.37 Outfit items of life-boats shall be checked for compliance with documentation agreed upon with the River Register and with requirements of Part V of RCCS. Outfit items of life-boats shall also be checked for completeness and proper location inside boat and availability of manufacturer documents.

7.3.38 During the technical supervision for signal means of ships under construction, the following checks shall be performed:
.1 compliances of signal means with documentation agreed upon with the River Register;
.2 installation of signal means on ships.
7.3.39 Check of compliance of signal means with agreed technical documentation shall include check of data sheets and certificates, check of signal means and comparison of accompanying documents with markings and brands applied to signal means.

7.3.40 Check of installation of signal means on ships shall include visual inspection and check measurements (checks) to ascertain the following:

1. correct location of stationary signal means in vertical and horizontal planes and with reference to ship centreline;
2. correct installation and fastening of signal means;
3. ease of dismounting of signal means and replacement of replaceable parts;
4. correct wiring of electric cables and protective earthing of signal means;
5. effective protection against radio interference created by electrical signal means;
6. quality of mounting of compressed air, vapour or other agent piping for actuating acoustical signal means;
7. operability of structures and safety of devices and appliances for actuating pyrotechnic signal means and their storage locations.

7.3.41 When conducting the technical supervision for fire protection, navigation and emergency outfit and pyrotechnic and acoustical signal means, check the following:

1. availability of documents on outfit items and their validity;
2. complete set of outfit according to the design and Rules;
3. location and fastening of outfit items on ship according to the design.

7.3.42 In addition to requirements of 7.3.41.1, installation of onboard fire extinguishers and availability of certificate of compliance of fire extinguishers with fire safety regulations (Federal law No. 123-ФЗ dated 02.07.2008).
8 ELECTRIC EQUIPMENT

8.1 GENERAL REQUIREMENTS

8.1.1 This section covers requirements to technical supervision during manufacture, on-board installation and testing of electric equipment stated in the Nomenclature.

8.1.2 Technical supervision of electric equipment by the River Register provides:
  .1 approval of technical documentation, test program for electric equipment;
  .2 technical supervision during manufacture and tests of electric equipment;
  .3 technical supervision during installation and tests of on-board electric equipment.

8.1.3 Technical supervision of electric process and household equipment shall be limited to the following checks:
  .1 insulation condition and resistance;
  .2 using distribution systems;
  .3 for serviceability of points of connection to power sources;
  .4 explosion-proofness level of electric equipment during arrangement in explosion-hazardous spaces and areas;
  .5 types, brands and cross-sections of the cables used;
  .6 earthing.

8.1.4 All types of electric equipment, installation works, valves and material, which become unavailable for check after their fitting and completion of works, shall be submitted to the Surveyor at the stage of works when checks provided by the Rules are possible.

8.2 TECHNICAL SUPERVISION DURING MANUFACTURE

8.2.1 Technical supervision during manufacture of electric equipment includes:
  .1 checking for availability of the approved technical documentation and test program;
  .2 monitoring of the used materials to meet the requirements of 2.4 Part VI RCCS;
  .3 item inspection;
  .4 supervision during tests.

8.2.2 During inspection, the following shall be checked:
  .1 the documents for materials used during manufacture;
  .2 technical condition of components included in the survey item;
  .3 installation quality of the item electric circuit;
  .4 strength of connection and fastening of assemblies, live parts, welded, soldered, screwed or other structural and contact joints;
  .5 presence of corrosion-resistant coatings;
  .6 availability of necessary markings and inscriptions;
  .8 technical condition of contact and protection terminations of cables and wires;
  .9 serviceability of structures providing electric safety.

8.2.3 Type specimens shall be tested as per the approved test program, developed in accordance with Appendix 15. Test types shall be established by Part VI RCCS.
8.2.4 Type specimens of cable items shall be tested on flame retardence as per the procedure given in Appendix 16.

8.2.5 Serial items shall be tested as per 1 to 3 Appendix 15.

8.3 TECHNICAL SUPERVISION DURING ONBOARD INSTALLATION

8.3.1 When surveying foundations and other support structures for fitting electric and electronic equipment, the following shall be checked:

.1 quality of the performed works, absence of sharp edges and other defects causing damages of the electric / electronic equipment to be fitted;

.2 possible access for maintenance of electric and electronic equipment;

.3 compliance of the position of electric / electronic equipment with the requirements of the Rules (fitting on the shell plating of the ship, walls of fuel, oil, water tanks, pressure vessels is not permitted) and the approved technical documentation;

.4 remote location of electric/electronic equipment and its energized parts from the hull plating, deck and platform platings;

.5 remote location of electric/electronic equipment from combustible materials, heat sources, emissions of gas, steam and water as well as pipelines, tanks, valves and other fittings which may accommodate damages of electrical equipment or cause combustion of nearby materials.

8.3.2 When surveying electrical propulsion systems, the following shall be checked:

.1 absence of flange or thread connections of pipelines, valves and other fittings above electric machinery of electric propulsion installation;

.2 arrangement of water coolers, their pipelines, availability of valves in water mains, of quick-release valves.

8.3.3 When surveying cable network, the following shall be checked:

.1 removal of cable routes from potential places of oil and oil products;

.2 proper structure of the cable support devices;

.3 sufficient and periodical cable fastenings on support structures;

.4 separate laying of cables with various purposes and voltages;

.5 compliance of structures and methods of fitting pipes, compensators and methods of fastening cables, channels, conduits, risers, sleeves, bus line carcasses, pull cable boxes, specific sealing structures and other devices for laying cables through bulkheads and decks with the technical documentation requirements;

.6 proper cable laying in explosion-hazardous spaces and areas and fire-hazardous spaces;

.7 marking, terminations in cable conductors and wires.

8.3.4 When surveying storage batteries, the following shall be checked:

.1 compliance of the battery room (locker) and arrangement of storage batteries with the Rules requirements;

.2 secure attachment of batteries;

.3 absence of trapped zones in the deck-head of battery rooms;

.4 availability of autonomous ventilation in the battery room;

.5 serviceability of blocking preventing from charging batteries prior to activating ventilation of an accumulator room;

.6 explosion protection measures.

8.3.5 Technical supervision during onboard installation of Domestic, household and engineering electric equipment includes the following checks:

.1 compliance of the electromagnetic interference level (as per supporting documents) with the requirements of 2.7 Part VI of the Rules. In case of no information presentation on the electromagnetic interference level, no electromagnetic interference influence, caused by the equipment, should be confirmed. The requirement applies to the equipped fitted in spaces for operation with radio communication aids, navigation aids, and to control systems of technical facilities including electronic components;
.2 insulation resistance;
.3 cable routes from power source to equipment;
.4 for serviceability of points of connection to power sources;
.5 protective devices;
.6 electrostatic and galvanic sparking safety aids;
.7 protective groundings.

8.3.6 The Surveyor shall verify that after fitting at standard places, all the electric equipment as per the protection degree, completion, quantity, electric protection, cable network, arrangement in spaces and areas of the ship, easy maintenance, controllers and regulators, fencings, fire and explosion safety measures, electric shock protection, protective grounding and other characteristics and parameters complies with its purpose and ensures safe navigation of the ship.

8.3.7 The fitted electric equipment shall be inspected after laying, fixing and connecting all cables to the equipment.

8.3.8 When checking the installation of electric equipment for oil tankers, meeting the requirements of the Rules for the equipment of these ships shall be additionally controlled.

8.4 MOORING TRIALS

8.4.1 During mooring trials, all consumers shall be supplied from standard power sources.

When standard power consumers do not ensure the required load for ship's generators during mooring trials, specific loading appliances shall be used.

8.4.2 Parameters checked during mooring trials of the electrical propulsion system for the built ship, see Appendix 17.

8.4.3 During mooring trials of electrical propulsion system, the following shall be checked:
.1 proper operation of the installation for starting and reversing in all reversal variants provided by the design documentation;
.2 serviceability of starting aids for diesel generators, backup exciters, fans, coolers and lubricators;
.3 possible unit control from local and remote stations;
.4 sparking degree under brushes at load and reverses;
.5 serviceability of protectors, alarms and blocking;
.6 insulation resistance of electric machines, cable network and auxiliary units of electric propulsion system in cold and hot states;
.7 proper readings of the propeller shaft revolution frequency indicators in the engine room and in the wheelhouse.

8.4.4 Generators of the ship's electric power plant shall be tested in all modes together with the main switchboard.

The following shall be tested:
.1 serviceability of generators as per the test program;
.2 stable parallel work at different loads and generator load transfer;
.3 serviceability of voltage regulators and distributors of active and reactive loads between generators;
.4 adjustment of automatic generator protectors;
.5 sparking degree under the generator brushes;
.6 insulation resistance;
.7 serviceability of automatic synchronizers and load dividers.

8.4.5 During functional test of batteries, the following shall be checked:
.1 electrolyte density and filling level in storage batteries;
.2 insulation resistance;
.3 operation of the charging device and battery in case of discharge;
.4 actuation of automatic protectors (reverse-current protection, etc.);
.5 battery discharge capacity in operation as intended and voltage of its clamps;
.6 efficient ventilation of the room / locker (on board the prototype ships).
8.4.6 When testing power distribution devices, the following shall be checked:

.1 serviceability of devices at the load conditions in all modes in load combinations / variants specified by the ship design;
.2 possible control transfer from the main stations (consoles) to local ones and their uninterruptible operation in case of such control;
.3 compliance of the set control element positions with actual operating modes for the controlled item;
.4 adjustment of automatic protectors (by inspection of the actuation set points and by random tests of automates, except for short-circuit protection), interlockings and alarms;
.5 readings of instruments and recorders;
.6 insulation resistance.

8.4.7 When testing electric drives, they reveal characteristics of each electric drive and its compliance with its purpose.

In addition to these tests, the following shall be checked:

.1 serviceability of the drive at the load conditions during the time determined by the test program (using instruments, if necessary);
.2 possible control of the drive from the remote and local stations and deactivation by means of emergency switches;
.3 proper operation of limit switches, brakes, lockings, control devices, automatic protectors and alarms;
.4 compliance of heat protection settings with currents of the protected electric motors;
.5 insulation resistance of electric motors and equipment in cold and hot conditions.

8.4.8 When testing control and alarm devices, the following shall be checked:

.1 coordinated action of setters and actuators;
.2 serviceability of alarms, devices, equipment;
.3 actuation of general and fire alarm;
.4 insulation resistance.

8.4.9 During tests of emergency electrical propulsion system, the following shall be checked:

.1 reliable automatic start of emergency diesel generator;
.2 reliable automatic connection of emergency generator to emergency switchboard busbars;
.3 uninterrupted connection of consumers to the emergency power source supply (diesel generator or storage battery);
.4 uninterrupted connection of consumers to the emergency short-term power source supply (if any);
.5 parameter values of emergency diesel generator by measuring voltage, revolution frequency and current during operation of all emergency consumers.

8.4.10 Proper operation of interlocking arrangements for the electric drive of the boat winch when activating the manual drive and limit switches.

8.4.11 Serviceability of main and emergency lighting torches shall be checked.

8.4.12 Serviceability of navigation lights and their malfunction alarms shall be checked.

8.5 RUNNING TRIALS

8.5.1 During running trials, they check the operation of the ship’s electrical propulsion system in all modes provided by the program, at actual loads and underway conditions, as well as proper operation of electric equipment. When developing the program, the duration of tests and checks of electric equipment shall be determined with regard to the time set in the corresponding sections of these Rules.

8.5.2 When testing ship’s power plant, the following shall be checked:

.1 sufficient power of generators for power supply of consumers in accordance with load mode table for all ship’s operating modes, except for standby one;
.2 uninterrupted activation of the emergency power source in case of no voltage of the main switchboard and no power from its necessary consumers;
.3 uninterrupted activation of the emergency short-term power source (if any) when commissioning the emergency diesel generator.

8.5.3 When testing electrical propulsion systems, the following shall be made:
   .1 tests specified in 8.4.3.1, 8.4.3.4 and 8.4.3.5;
   .2 measurement result analysis of the reverse length in different ship speeds.

8.5.4 Electric drives of pumps, compressors, separators, fans and other ship machinery shall be checked as intended in order to check the reliable (uninterruptible) operation, activation/deactivation, switching to the reserve set (if any), actions of remote consoles to activate/deactivate the electric drive, automatic activation of reserve electric drives as per the signals from the adjustable parameters of working medium on automated installations.

When checking the operating electric equipment, absence of loads, inadmissible temperature increases of hulls, shells, panels, bearings shall be checked. In addition, parameters of its own vibration and vibration caused by operation of main engines and other ship machinery or propellers shall be checked.

8.5.5 Electric drives of steering gears, their power supply systems (main and backup supply lines), control systems, rudder position indication system, electric drive operation / stop alarm system, shall be checked during the steering gear operation in all provided modes.

8.5.6 Steering gear drives shall be checked both during operation of two (if any) electric units of the steering drive, and of each power unit individually from all provided remote and local control stations when supplying electric drives of power units and control system from the main and backup supply line.

In this case, cycle of putting the rudder from side to side, provided in 7 of these Rules, shall be performed at least 5 times for each unit from each station and for each power supply line.

8.5.7 Electric drives of anchor and mooring arrangements, boat winches shall be checked during tests of the above arrangements, during the ship mooring/unmooring, unberthing, whilst at berth or at anchor.

8.5.8 During running trials, they measure insulation resistance of electric equipment both during its operation by means of boards for measuring insulation resistance, and by means of portable megger immediately after decommissioning with the equipment temperature set during operation.

8.5.9 Sparking degree of electric machines with collectors and contact rings shall be checked.

8.5.10 After running trials, they establish the inspection scope to open bearings of electric machines not heated during running trials in excess of the technical documentation norm.

8.5.11 When opening the electric machine, the following shall be checked:
   .1 technical condition of stator winding support structures;
   .2 location of winding wedges;
   .3 technical condition and location of poles with their windings;
   .4 secure attachment of rotating parts.


9 RADIO COMMUNICATION AIDS AND NAVIGATION EQUIPMENT

9.1 GENERAL REQUIREMENTS

9.1.1 This Section establishes requirements for technical supervision of the River Register during manufacture, on-board installation and tests of radio communication aids and navigation equipment in accordance with the Nomenclature.

9.1.2 Technical supervision of radio arrangements and navigation equipment by the River Register provides:
- approval of technical documentation, test program;
- technical supervision during manufacture and tests;
- technical supervision during installation and tests.

9.1.3 The River Register does not perform technical supervision during manufacture of navigation equipment, but during mooring and running trials, checks the navigation outfit availability on board the ship in accordance with standards specified in Table 10.2.2. Part V RCCS.

9.2 TECHNICAL SUPERVISION DURING MANUFACTURE

9.2.1 Technical supervision of radio arrangements and navigation equipment by the River Register includes:
- checking for availability of the approved technical documentation and test program;
- checking documents for components (if components are prescribed by the approved documentation);
- item inspection;
- supervision during tests.

9.2.2 When examining the item, the Surveyor:
- shall verify the documents for materials used during manufacture;
- shall examine the inside and the outside of the item;
- shall inspect the proper operation of the item;
- shall check the availability of necessary markings and inscriptions.

9.2.3 Type specimens of radio communication aids and navigation equipment shall be tested as per the approved test program developed in accordance with 1 to 3, 6 to 14 of Appendix 15.

Type specimens of portable radio equipment used in Global Maritime Distress and Safety System (GMDSS) shall be additionally tested for compliance with 16 of Appendix 15 with buoyancy requirements. The tests shall be also performed for compliance with 17 of Appendix 15.

9.2.4 Serial items shall be tested as per 1 to 3 Appendix 15.

9.3 TECHNICAL SUPERVISION DURING ONBOARD INSTALLATION AND TESTS

9.3.1 When controlling the arrangement of equipment and devices, the following shall be checked:
- the availability of documents confirming the compliance of the item with the requirements of Rules;
- placement, installation of items as per approved documentation;
9.3 easy arrangement, maintenance and repair of transmitters, receivers, indicators, control consoles, starters, converters, etc.;
9.4 complete set of operating documents.

9.3.2 When checking installation, the following shall be verified:
9.1 secure attachment of valves;
9.2 secure attachment of antennas;
9.3 antenna location relative to metallic parts of the ship;
9.4 laying, fastening and cable penetrations through the watertight decks and bulkheads;
9.5 compliance with brand drawings and cable cross-sections;
9.6 condition of external cable coverings;
9.7 excessive length of the cable before the entry of equipment;
9.8 continuity of screening of power cable network and radio cables;
9.9 hull grounding of cable network shells, radio equipment cases;
9.10 insulation resistance of antennas (except for antennas with DC short-circuit structure), cable network and power supply sources;
9.11 availability of fencings for live and rotating equipment parts;
9.12 fitting of protective devices near the transmitter entries;
9.13 resistance value of the protective grounding.

9.3.3 After installation and adjustment, radio communication aids and navigation equipment shall be subject to mooring and running trials as per the programs approved by the River Register. The equipment shall be supplied from the ship’s main.

9.3.4 When testing radio communication aids, the following shall be checked:
9.1 parameters and serviceability as per the approved test program in accordance with functional purpose of the radio station, with regard to the operating instructions;
9.2 quality of reception and availability of interference in all the receiver bands;
9.3 effective radio signal reception against interference caused by ship’s electric equipment.

9.3.5 When testing public address and broadcasting devices, the following shall be checked:
9.1 proper remote control of the public address device (start, deactivation, switching broadcasting lines, reset of programs and activation of forced broadcasting) from any command microphone stations regardless of the control element position for all the rest command microphone stations;
9.2 transmission quality of service orders from command microphone stations to all accommodation and public spaces, as well as to open decks;
9.3 available priority of service orders over broadcasting or audio recording if there is no additional command public address device for this purpose;
9.4 operation of visual alarms in each microphone station, that is activated when starting the command public address device;
9.5 remained serviceability of broadcasting line in case of short-circuit in loudspeaker branches;
9.6 absence of plug adapters in loudspeaker branches;
9.7 no clutter from electric equipment and radio communication aids.

9.3.6 When testing emergency position-indicating radio beacon, the following shall be checked:
9.1 availability of applicable documents confirming the emergency position-indicating radio beacon registration in international coordination and calculation centre of the COSPAS-SARSAT system and compliance of entries in registration documents on the item model and number, name of the radio beaconship, as well as available information on the expiry date of storage battery shelf life and date of the next due shore-based maintenance (not exceeding the established date during the check) in the radio beacon marking;
9.2 availability of documents on testing laboratory checks.

9.3.7 When testing the navigation equipment, it is checked as per the approved test program in accordance with its purpose with regard to the operating instructions.
10 MATERIALS

10.1 GENERAL REQUIREMENTS

10.1.1 This Section establishes requirements to technical supervision during manufacture and installation of mechanisms listed in Section 9 of the Nomenclature.

10.2 TECHNICAL SUPERVISION DURING MANUFACTURE

10.2.1 Technical supervision during manufacture of the materials includes:
   .1 checking for availability of the approved technical documentation and test program;
   .2 supervision during tests;
   .3 survey during type approval;
   .4 survey during manufacture, as prescribed by the Nomenclature.

10.2.2 In case of technical supervision during materials, the Surveyor shall check the acceptance tests performed by the technical control bodies in the scope specified in the technical documentation.

10.2.3 In case of the type approval, the materials shall be tested in the Surveyor's presence in accordance with the test program. The type specimen tests may be combined with tests in order to obtain the Recognition Certificate.

10.2.4 When surveying metals and alloys, forgings and castings, the Surveyor shall check:
   .1 documents of the performed tests prescribed by the Rules and agreed technical documentation;
   .2 company's documents on the performed acceptance prescribed by the agreed technical documentation;
   .3 documents confirming the production manufacture as per the agreed process (as prescribed by the Rules);
   .4 inspection of defect absence on the surface;
   .5 presence of defects, their nature and repair;
   .6 marking.
11 EQUIPMENT FOR PREVENTION OF ENVIRONMENT POLLUTION FROM SHIPS

11.1 GENERAL REQUIREMENTS

11.1.1 This Section establishes requirements to technical supervision during equipment manufacture and tests for prevention of environment pollution from ships, as well as during on-board installation and tests listed in accordance with the Nomenclature.

11.1.2 Equipment, parts and units shall be manufactured and installed in accordance with the technical documentation approved by the River Register, specified in Appendix 8.

11.1.3 Equipment shall have a nameplate with its purpose, manufacturer’s name, type and model, serial number and year of manufacture.

11.2 TECHNICAL SUPERVISION DURING MANUFACTURE

11.2.1 Technical supervision during manufacture of equipment for prevention of environment pollution from ships includes:

.1 checking for availability of the approved technical documentation and test program;
.2 inspection of material and components, verification of supporting documents;
.3 checking for compliance of the manufactured parts and units with the technical documentation approved by the River Register;
.4 check of welding operations;
.5 hydraulic tests;
.6 check of equipment in operation.

11.2.2 Elements of systems included in the equipment shall be subject to hydraulic tests in accordance with the requirements 6 of these Rules.

11.2.3 A type specimen of the equipment shall be subject to bench tests as per the program approved by the River Register.

When replacing the bench tests with on-board tests, they shall be performed as per the program-procedure approved by the River Register.

Scope of acceptance tests for serial items shall be established when drawing up and approving the test program with regard to the standard specimen test results.

11.2.4 Proper installation of pipelines, valves and cables shall be checked by visual inspection. Tightness of valve and pipeline connections shall be checked during hydraulic test.

11.2.5 Actuation of safety devices of the filtering equipment and sewage treatment plant shall be tested under pressure not exceeding 1.1 of the operating pressure.

11.2.6 Prior to commencing installation of the incinerator lining, they inspect walls for absence of bulges, saggings and roughnesses exceeding 10 mm per 1 m.

After installation, proper lining of the incinerator shall be checked. The brickwork surface shall be flat. Separate ledge steps shall not exceed 3 mm, and roughness shall not exceed 10 mm per 1 m. Lining or its separate parts shall not shift.

The air hole diameter deviation from the set dimensions shall not exceed ±5 mm, and misalignment of the air hole and nozzle axes shall not exceed 2 mm.
After the final assembly, leak tests of the incinerator casing by air shall be performed (if provided by the technical documentation). Pressure and possible air leaks shall be in conformity with technical documentation approved by the River Register.

11.3 TECHNICAL SUPERVISION DURING ONBOARD INSTALLATION AND TESTS

11.3.1 When checking the equipment installation, the Surveyor controls the compliance of the performed works with the requirements of the technical documentation approved by the River Register.

11.3.2 Settling tanks, isolated ballast tanks, sewage and oily waters collecting tanks shall be checked for compliance with the operating documentation approved by the river Register, and shall be subject to tightness tests during the hull formation.

Structures, equipment and systems shall be considered to have passed the tests, if no leaks or sweating of welds, leakage in pipe expanded connection, as well as in fitting connecting flanges, and instrument connections are detected.

11.3.3 When checking the installation of hoses included in ship's outfit and used for pumping oil, oil-containing and sewage water, it is necessary to check the marking allowing to identify items, as well as the manufacturer's documents, specifying the following:

- the type of liquid allowed for hose pumping;
- the date of manufacturing;
- the working pressure;
- the date of tests and the test pressure.

11.3.4 Upon completion of installation works and hydraulic tests, the equipment shall be checked in operation, as per the program approved by the River Register, drawn up with regard to the requirements in Appendix 18.
1 This Nomenclature (Table A1.1) establishes the list of items, whose technical supervision during manufacture, installation and tests is performed by the River Register as per the Rules, stamping these items in cases prescribed by this Nomenclature, as well as performing the applied forms of technical supervision. Numbers of Sections in Table A1.1, except for Section 11, repeat numbers of the RCCS corresponding parts.

2 The following symbols are used in this Nomenclature:

- P — technical supervision carried out by the River Register;
- OP — technical supervision carried out by the River Register and company's personnel;
- OT — technical supervision in the form of type approval;
- ПД — technical supervision in the form of recognised documentation;
- К — branding. During technical supervision in the form OP (supervision is performed by the Register and the company's personnel), stamping is not necessary.

### Table A1.1

<table>
<thead>
<tr>
<th>Item under technical supervision</th>
<th>Technical supervision by the River Register during manufacture</th>
<th>Technical supervision by the River Register during ship construction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>type specimen</td>
<td>serial items</td>
</tr>
<tr>
<td>Hull and hull equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Outer shell plating with set. Decks and platforms</td>
<td>—</td>
<td>P</td>
</tr>
<tr>
<td>1.2 Double bottom, inner sides</td>
<td>—</td>
<td>P</td>
</tr>
<tr>
<td>1.3 Longitudinal and transverse bulkheads, built-in and removable tanks. Trusses or pillars</td>
<td>—</td>
<td>P</td>
</tr>
<tr>
<td>1.4 Shaft alleys</td>
<td>—</td>
<td>P</td>
</tr>
<tr>
<td>1.5 Superstructures, deckhouses, cargo hold coamings</td>
<td>—</td>
<td>P</td>
</tr>
<tr>
<td>1.6 Foundations for main and auxiliary engines and boilers</td>
<td>—</td>
<td>P</td>
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<tr>
<td>1.7 Stems, sterns, keels, propeller shaft brackets</td>
<td>—</td>
<td>P</td>
</tr>
<tr>
<td>1.8 Foil arrangements of hydrofoils, flexible rails of hovercraft</td>
<td>—</td>
<td>P</td>
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<tr>
<td>1.9 Stem-tubes and rudder tubes, fixed nozzles, tubes and water-jet channels</td>
<td>—</td>
<td>P</td>
</tr>
<tr>
<td>1.10 Fencings, handrails, gangways:</td>
<td>—</td>
<td>P</td>
</tr>
<tr>
<td>.1 bulwark, guard rails, handrails, gangways</td>
<td>—</td>
<td>ПД</td>
</tr>
<tr>
<td>.2 coamings, lobbies band other fencings of hull openings</td>
<td>—</td>
<td>ПД</td>
</tr>
</tbody>
</table>
### 3 Fire protection

#### 3.1 Structural fire protection:
- .1 Bulkheads and inner decks
- .2 Fire doors
- .3 Fire dampers
- .4 Fire-resisting divisions
- .5 Penetrations in fire-resisting divisions of A, B and C classes
- .6 Alarm and control systems for fire doors
- .7 Flame arresters
- .8 Spark arresters of exhaust systems and flues

#### 3.2 Fire-fighting equipment and fire-extinguishing systems

#### 3.2.1 Fire-extinguishing, water-spraying and inert gas systems

#### 3.2.2 Items and valves for fire extinguishing, water-spraying and inert gas systems:
- .1 Storage reservoirs for fire-extinguishing medium
- .2 Pneumohydraulic tanks
- .3 Pressure vessels and apparatuses of fire-extinguishing systems
- .4 Carbon dioxide, compressed air and nitrogen cylinders
- .5 Fire-extinguishing system pumps
- .6 Valves of fire extinguishing, water-spraying and inert gas systems
- .7 Steam generators
- .8 Aerosol generators
- .9 Monoblock pumps
- .10 Steam generator
- .11 Gas analyzers
- .12 Nozzles for water-spraying and water fog systems
- .13 Nozzles of dual-purpose type (spray/jet type)
- .14 Portable foam set

#### 3.2.3 Safety devices in venting systems to prevent the passage of flame into the cargo tanks of tankers

#### 3.3 Units for domestic purpose, domestic units and fire-extinguishing systems

#### 3.3.1 Gaseous fuel systems used for domestic purposes
- .1 Equipment for gaseous fuel systems, used for domestic purposes, except for that stated in 2.3.3

#### 3.3.2 Water extinguishing system for exhaust ducts from a galley range
- .1 Equipment for systems of automatic or manual fire extinguishing for exhaust ducts from a galley range

#### 3.3.3 Domestic heaters working on oil fuel, liquid gas or solid fuel:
- .1 Galley ovens
- .2 Domestic liquefied gas units
- .3 Heaters and stoves regulated by the Rules

#### 3.4 Fire alarm
- .1 Fire detection and fire alarm systems, fire-smothering system release warning system, including:
<table>
<thead>
<tr>
<th>Item under technical supervision</th>
<th>Technical supervision by the River Register</th>
<th>Item under technical supervision</th>
<th>Technical supervision by the River Register</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>during manufacture</td>
<td></td>
<td>during ship construction</td>
</tr>
<tr>
<td></td>
<td>type</td>
<td>specimen</td>
<td>serial items</td>
</tr>
<tr>
<td>1. smoke, light, heat detectors and manual detectors</td>
<td>P</td>
<td>OT</td>
<td>—</td>
</tr>
<tr>
<td>2. devices and equipment for automatic fire extinguishing systems and fire alarm</td>
<td>P</td>
<td>OT</td>
<td>—</td>
</tr>
<tr>
<td>3. alarm starting fire-protection devices</td>
<td>P</td>
<td>OT</td>
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<tr>
<td>3.5 Fire outfit</td>
<td></td>
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<tr>
<td>.1 fire outfit, except for that stated in 3.5.2</td>
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<tr>
<td>.2 self-contained breathing apparatuses included in fireman’s outfit</td>
<td>P</td>
<td>OT</td>
<td>—</td>
</tr>
<tr>
<td>4.1 Main and auxiliary engines:</td>
<td>P</td>
<td>P/OP</td>
<td>K</td>
</tr>
<tr>
<td>.1 bedplates</td>
<td></td>
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<tr>
<td>.2 crankcases</td>
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<td></td>
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<tr>
<td>.3 cylinders</td>
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<tr>
<td>.4 cylinder liners</td>
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<td>.5 cylinder covers</td>
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<tr>
<td>.6 tie rods</td>
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<td>.7 pistons</td>
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<td>.8 piston pins</td>
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<tr>
<td>.9 connecting rods</td>
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<tr>
<td>4.2 Shafting</td>
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<tr>
<td>.1 thrust, intermediate, propeller shafts</td>
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<tr>
<td>.2 liner and water insulation of propeller shafts</td>
<td></td>
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<tr>
<td>.3 thrust and main bearings</td>
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<tr>
<td>.4 bearings for propeller shafts</td>
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<tr>
<td>.5 couplings of shafting shafts</td>
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<tr>
<td>.6 stern gears and bulkhead seals of stern gears</td>
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<tr>
<td>.7 shafting coupling bolts</td>
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<tr>
<td>4.3 Gears and disengaging couplings of main engines</td>
<td>P</td>
<td>P/OP</td>
<td>K</td>
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<tr>
<td>.1 reduction gear and coupling cases</td>
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<td>.2 gear wheels</td>
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<tr>
<td>.3 reduction gear shafts</td>
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<td>4.4 Propellers</td>
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<tr>
<td>.1 propellers</td>
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<tr>
<td>.2 vertical axis propellers</td>
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<td>.3 water-jet propellers</td>
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<tr>
<td>.4 air propellers</td>
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</table>
### Technical Supervision by the River Register

#### during construction

<table>
<thead>
<tr>
<th>Item under technical supervision</th>
<th>during manufacture</th>
<th>during ship construction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>type specimen</td>
<td>serial items</td>
</tr>
<tr>
<td>4.5 Compressors, pumps, fans and separators</td>
<td>P P/OP K P P</td>
<td></td>
</tr>
<tr>
<td>4.5.1 Power-driven air compressors:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.1 crankshafts of compressors, pumps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.2 shafts of compressors, pumps, fans and separators</td>
<td></td>
<td></td>
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<tr>
<td>.3 impeller, vanes of compressors, pumps, fans and separators</td>
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<tr>
<td>.4 piston crowns of compressors, pumps</td>
<td></td>
<td></td>
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<tr>
<td>.5 connecting rods of compressors, pumps</td>
<td></td>
<td></td>
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<tr>
<td>.6 pistons of compressors, pumps</td>
<td></td>
<td></td>
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<tr>
<td>.7 cylinder liners of compressors, pumps</td>
<td></td>
<td></td>
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<tr>
<td>.8 cylinder covers of compressors, pumps</td>
<td></td>
<td></td>
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<tr>
<td>.9 cylinders of compressors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5.2 Pumps being a part of systems, except for hand-driven pumps</td>
<td>P P/OP</td>
<td></td>
</tr>
<tr>
<td>4.5.3 Hand-driven pumps and ejectors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5.4 Fans being a part of systems regulated by Rules</td>
<td>P P/OP</td>
<td></td>
</tr>
<tr>
<td>4.5.5 Separators</td>
<td>P P/OP</td>
<td></td>
</tr>
<tr>
<td>4.5.6 Fans for dynamically supported ships</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.6 Boilers, heat exchangers and pressure vessels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.6.1 Steam turbines</td>
<td>P P/OP K P P</td>
<td></td>
</tr>
<tr>
<td>.1 cases, shells, bottoms and drums</td>
<td></td>
<td></td>
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<tr>
<td>.2 manifolds and chambers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.3 flame tubes</td>
<td></td>
<td></td>
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<tr>
<td>.4 boiler stays</td>
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<tr>
<td>.5 burning units</td>
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<tr>
<td>.6 economizers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.7 steam collectors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.8 superheaters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.6.2 Heat exchangers and pressure vessels, which being in service are fully or partially filled with gas or steam with a working pressure of at least 0.07 MPa and have a capacity of at least 0.025 m³ or with a production of working pressure, MPa, for a capacity, m³, of 0.03 MPa·m³ and over:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.1 fuel and oil heaters, ship's water heaters</td>
<td>P O T</td>
<td></td>
</tr>
<tr>
<td>.2 steam boiler vaporizers</td>
<td>P O T</td>
<td></td>
</tr>
<tr>
<td>.3 fuel, oil and water coolers for main and auxiliary engines</td>
<td>P O T</td>
<td></td>
</tr>
<tr>
<td>.4 steam condensers</td>
<td>P O T</td>
<td></td>
</tr>
<tr>
<td>.5 fuel, oil and water filters</td>
<td>P P/OP</td>
<td></td>
</tr>
<tr>
<td>.6 pressure vessels</td>
<td></td>
<td></td>
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<tr>
<td>4.6.3 Fittings:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.1 fittings for boilers, pressure vessels and systems</td>
<td>P O T</td>
<td></td>
</tr>
<tr>
<td>.2 safety valves</td>
<td>P O T</td>
<td></td>
</tr>
<tr>
<td>4.7 Refrigerating plants:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.1 refrigerant compressors</td>
<td>P P/OP</td>
<td></td>
</tr>
<tr>
<td>.2 refrigerant, liquid coolant, cooling water pumps</td>
<td>P P/OP</td>
<td></td>
</tr>
<tr>
<td>.3 heat exchangers and other equipment, as well as vessels operating under the refrigerant pressure, liquid coolant or cooling water</td>
<td>P O T</td>
<td></td>
</tr>
<tr>
<td>.4 fittings</td>
<td>P O T</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 1  

Continuation of Table A1.1

<table>
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<tr>
<th>Technical supervision by the River Register during manufacture</th>
<th>during ship construction</th>
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<tbody>
<tr>
<td>Item under technical supervision</td>
<td>during manufacture</td>
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<tr>
<td></td>
<td>type</td>
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<tr>
<td>1.5 isolation of cooling spaces, pipelines and equipment of ship refrigeration plants</td>
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<tr>
<td>4.8 Air conditioners for accommodation and service spaces</td>
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<td>4.9 Systems</td>
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<tr>
<td>4.9.1 General systems, including bilge, ballast and liquid cargo, cargo heating, inert gas, smoke generation, explosion-hazardous spaces, oil tanker gas-outlet systems; air, gas-outlet, overflow and sounding pipeline systems, ventilation system; steam heating system</td>
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<tr>
<td>4.9.2 Power plant systems, including fuel, oil, cooling, compressed air, feed water, gas-discharging, steam pipeline and blowing systems</td>
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<tr>
<td>4.9.3 Valves for pressure of 1.0 MPa and over, including pipes and valves for pipelines of I and II classes (bottom, side valves, valves arranged on the collision bulkhead)</td>
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<tr>
<td>4.9.4 Items and valves of hydraulic systems of the ship: slides, valves of hydraulic systems of the ship, pump units of the ship's hydraulic systems, ship's manipulators, switches, ship's chokes, ship's hydraulic motors, hydraulic filters, pneumatic-hydraulic accumulators, hydraulic machines, hydraulic cylinders</td>
<td>—</td>
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<tr>
<td>4.9.5 Pipeline connections</td>
<td>—</td>
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<tr>
<td>4.9.6 Manual, remote and automatic valves, including</td>
<td>—</td>
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<tr>
<td>.1 units and parts of ship's valves</td>
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<tr>
<td>4.9.7 Flexible joints and ship hoses</td>
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<tr>
<td>4.9.8 Compensators</td>
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<tr>
<td>4.9.9 Silencers of exhaust systems and flues</td>
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<td>4.10 Automation:</td>
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<tr>
<td>.1 indication systems, alarm systems, protection systems of electric propulsions and their elements, devices for emergency stop of main engines</td>
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<tr>
<td>.2 systems for automation and control of main engines (electrical propulsion system) and propellers</td>
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<tr>
<td>.3 systems for automation and control of auxiliary engines, devices for automatic stop of ship auxiliary equipment</td>
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<td>.4 ship equipment control systems (including controllers and automation equipment)</td>
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<tr>
<td>4.11 Shock absorbers (vibroinsulators)</td>
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<tr>
<td>4.12 Diesel generators, geared diesel units, air-injection units and diesels-pump units</td>
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5 Ship arrangements and outfit

<table>
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<tr>
<th></th>
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<tr>
<td>5.1 Steering gears, including:</td>
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<tr>
<td>.1 rudder stocks and rudder pieces</td>
<td>Р</td>
<td>П/ОР</td>
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<tr>
<td>.2 Rudder blade and steering nozzle assembly</td>
<td>Р</td>
<td>П/ОР</td>
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<tr>
<td>.3 rudder stock bearings</td>
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<td>.4 connection parts: of rudder stocks, rudder stock with rudder blade, with steerable nozzle, of tiller or quadrants with rudder stock</td>
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<td>.5 tillers, quadrants</td>
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<tr>
<td>.6 rudder angle, steering nozzle limiters and their parts</td>
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## Continuation of Table A.1

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<td>serial items</td>
<td>Branding</td>
<td>Formation, installation</td>
<td>Mooring trials</td>
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<td>.7 roll wiring parts of steering drives</td>
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<td>.8 parts of steering line piloting</td>
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<td>.9 steering control systems, steering gears and steering machines</td>
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<td>5.2 Thrusters</td>
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<td>5.2.1 Assembled steerable propellers, thrusters</td>
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<td>.1 units and parts used as components of steerable propellers and thrusters</td>
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<td>5.3 Anchoring devices:</td>
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<td>П/ОП К</td>
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<td>.3 anchor stoppers</td>
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<td>П/ОП</td>
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<td>.4 device to drop bitter end of the anchor chain or rope</td>
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<td>.6 windlasses, capstans and anchor winches</td>
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<td>.1 bollards, cleats, mooring chocks, rollers and stoppers</td>
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<td>5.5 Towing and coupling arrangements:</td>
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<td>.1 bitts, bollards, mooring chocks, hawses, stoppers, cleats</td>
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<td>.2 towing hooks</td>
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<td>П/ОП К</td>
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<td>.3 towing rails with parts for fastening them to the hull, towing arches</td>
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<td>.6 tensioning stations, rope shortening devices, shock absorbers</td>
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<td>.8 towing winches</td>
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<td>5.6 Cargo handling appliances (cranes, derricks, lifts):</td>
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<td>П/ОП К</td>
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<td>.1 metal structures</td>
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<td>.3 control stations</td>
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<td>.7 lift equipment (landing doors, counterweights, buffers, safety devices)</td>
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<td>ОТ</td>
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<td>.8 mechanisms for cargo handling appliances</td>
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<td>.9 ship's cargo and mast devices</td>
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<td>.10 cranes, beam cranes, ship's telphers</td>
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<td>.11 elevators and other ship's cargo handling gears</td>
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<td>.12 drive chains, tractive and cargo plate chains</td>
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<td>5.7 Wheelhouse hoisting arrangement, hatch arrangements:</td>
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<td>.3 hoisting gears</td>
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<td>.4 equipment of hatch closures (winches, drives, etc.)</td>
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<td>П/ОП К</td>
<td>П</td>
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<td>5.8 Life-saving appliances</td>
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## Table A1.1

### Continuation of Table A1.1

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<th>Item under technical supervision</th>
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<td>.1 lifeboats, life rafts and saving apparatuses</td>
<td>P</td>
<td>P/OP</td>
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<td>.2 davits and launching arrangements of lifeboats and liferafts, including launching arrangements of rescue boats, &quot;float-free launching&quot; arrangements of life-saving appliances, hydrostatic release units, including the release system for totally enclosed lifeboats, release mechanism for lifeboats and rescue boats, liferafts launched by means of fall(s)</td>
<td>P</td>
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<td>.3 boat drive, including engines for lifeboats and rescue boats, outboard motors for rescue boats</td>
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<td>.4 control device for launching lifeboats</td>
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<tr>
<td>.5 equipment for lifeboats and liferafts</td>
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<td>ПД</td>
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<td>.6 lifebuoys, lifejackets (including for kids), buoyant lifelines, immersion suits, thermal protective aids</td>
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<td>П/OP</td>
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<td>.7 boat winches, topping winches, salvage winches</td>
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<td>.8 line-throwing appliances</td>
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<td>.9 self-activating smoke signals for lifebuoys</td>
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<td>.10 radar reflectors for lifeboats and rescue boats, liferafts</td>
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<td>5.9 Signal means:</td>
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<td>.1 spar and signal mast rigging</td>
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<td>.2 navigation lights</td>
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<td>.3 shapes and sound signals</td>
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<td>.5 self-igniting lights of life-saving appliances</td>
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<td>.6 shapes</td>
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<td>.7 pyrotechnic signal means</td>
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<td>5.10 Navigation outfit</td>
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<td>5.11 Emergency outfit</td>
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<td>5.12 Ship's ropes of all purposes (steel wire ropes, natural and synthetic fiber ropes)</td>
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<td>5.13 Hull attachments, equipment of rooms and closures of openings in the hull, decks, superstructures and cockpits:</td>
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<td>.1 manholes</td>
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<td>.2 water-and-gastight and untight doors (including water-and-gastight doors with wedge clips, sliding doors, untight cabin folded and shutter doors, galley doors, general-purpose untight doors) with organs and drives for controlling the closing of doors, alarms and indicators, closing of shell doors</td>
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<td>.3 scuttles, windows and light hatches, hinged non-fixed deadlights</td>
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<td>.4 deck ladders (stairways and ladders), accommodation ladders, pilot ladders, embarkation ladders, pilot transfer arrangements</td>
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<tr>
<td>.5 stanchions and jack rods, life rope racks</td>
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<td>.6 different hull attachments: screw turnbuckles, D-shackles, thimbles, slip-hooks, sister-hook, sealing gaskets, fasteners, small hull attachments (doors, air-vents, curtains, etc.), etc.</td>
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<td>.7 cargo hatch covers</td>
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<td>.8 covers of companion, light, ventilation hatches, filling openings and tanks</td>
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<td>.9 mouths and air pipe heads</td>
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### 6 Electrical equipment

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<td>.2 Main and emergency power sources:</td>
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<td>.1 generators</td>
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<td>.2 accumulators and batteries</td>
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<td>.3 Power and lighting transformers, electric energy converters:</td>
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<td>.1 transformers</td>
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<td>.2 rotary and static frequency converters (rectifiers, inverters, frequency converters, soft starters)</td>
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<td>.3 electrical machinery amplifiers</td>
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<td>.4 Switchboards (main and emergency switchboards, monitoring, control and alarm panels):</td>
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<td>.1 protection, control and commutation facilities (circuit-breakers, disconnectors, relays, switches, fuse links, etc.)</td>
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<td>.2 reactors, condenser units for power factor increasing</td>
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<td>.3 fixed electric instruments</td>
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<td>.4 cases of switchboards and electric cabinets</td>
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<td>.5 AC/DC motors of 0.5 kW and over:</td>
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<td>.2 ship non-critical technical equipment</td>
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<td>.6 Starting equipment of electric motors</td>
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<td>.7 Main lighting of spaces and places of essential services, escape routes and emergency lighting:</td>
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<td>OT</td>
</tr>
<tr>
<td>.2 fittings of lighting networks (switches, sockets, junction/branching boxes)</td>
<td>P</td>
<td>OT</td>
</tr>
<tr>
<td>.3 light evacuation indicators (photoluminiscent and electric)</td>
<td>P</td>
<td>OT</td>
</tr>
<tr>
<td>.4 safe electric lamps (manual torchlights), battery torchlights</td>
<td>— ПД</td>
<td>— — —</td>
</tr>
<tr>
<td>.5 floodlights</td>
<td>P</td>
<td>OT</td>
</tr>
<tr>
<td>.6 Electrical machine telegraphs, rudder / CPP blade position indicators, propeller shaft tachometers</td>
<td>P</td>
<td>P/OP</td>
</tr>
<tr>
<td>.9 Service telephone system</td>
<td>P</td>
<td>P/OP</td>
</tr>
<tr>
<td>.10 General alarm system (devices and contactors of light and sound signals)</td>
<td>P</td>
<td>OT</td>
</tr>
<tr>
<td>.11 Alarm system of watertight doors</td>
<td>P</td>
<td>OT</td>
</tr>
<tr>
<td>.12 Electric equipment in explosive spaces and areas (explosion-proof)</td>
<td>P</td>
<td>P/OP</td>
</tr>
<tr>
<td>.13 Cable network:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.1 cables</td>
<td>P</td>
<td>P/OP</td>
</tr>
<tr>
<td>.2 wires</td>
<td>P</td>
<td>P/OP</td>
</tr>
<tr>
<td>.3 cable penetration seals</td>
<td>P</td>
<td>OT</td>
</tr>
<tr>
<td>.14 Lightening conductors and groundings, cathodic protection; hull grounding devices for oil tankers</td>
<td>— ПД</td>
<td>— P —</td>
</tr>
<tr>
<td>.15 Electric heaters of fuel and oil</td>
<td>P</td>
<td>P/OP</td>
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</tbody>
</table>
### Technical supervision by the River Register during manufacture during ship construction

<table>
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<tr>
<th>Item under technical supervision</th>
<th>Type specimen</th>
<th>serial items</th>
<th>Branding</th>
<th>Formation installation</th>
<th>Mooring trials</th>
<th>Running trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.16 Heating appliances:</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>.1 heaters, electric fireplaces, electric galley heaters, electric water heaters</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>.2 heating cables</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.17 Equipment for cargo handling appliances</td>
<td>P OT</td>
<td></td>
<td>P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.18 Equipment for air conditioners</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.19 Control system and alarm sensors</td>
<td>P OT</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6.20 Domestic and engineering electric equipment</td>
<td></td>
<td></td>
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<tr>
<td>7 Radio communication aids</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.1 VHF radio installation, VHF radiotelephone station (300.025 to 300.500 MHz)</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.2 MF radio installation, MF/HF radio installation</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.3 Satellite communication aids</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.4 EGC receiver</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5 HF direct-printing radio-telegraph receiver for MSI reception</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
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<tr>
<td>7.6 NAVTEX receiver</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
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</tr>
<tr>
<td>7.7 Satellite EPIRB of COSPAS-SARSAT system, VHF EPIRB</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>7.8 Distress position finding device: radar transponder or automatic identification system (AIS) transmitter</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>7.9 two-way VHF radiotelephone apparatus for life-saving appliances and for aircraft communication</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.10 Portable VHF radio installation, VHF radiotelephone station (300.025 to 300.225 MHz)</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
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<tr>
<td>7.11 Public address and broadcasting devices, voice communication system, internal communication equipment</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.12 Antenna assemblies</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
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<tr>
<td>7.13 Security alert system</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>7.14 Converters for equipment power supply, chargers</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
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<tr>
<td>7.15 Spaces for radio equipment</td>
<td></td>
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<tr>
<td>8 Navigation equipment</td>
<td></td>
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<tr>
<td>8.1 Magnetic compasses</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>8.2 Gyrocompasses</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.3 Remote heading transmitting devices</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.4 Radar stations (electronic plotting aids, automatic tracking aids, automatic radar plotting aids)</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.5 Logs (devices measuring speed and the distance run)</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.6 Echosounders</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.7 ship heading/trajectory control systems (autopilots)</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.8 Rate-of-turn meters</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.9 Receivers of global navigation satellite systems</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.10 Voyage data recorders</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.11 External audio signal reception systems</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.12 Shipborne transponder of the Automatic Identification System (AIS)</td>
<td>P P/OP</td>
<td></td>
<td>P P P</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Table A.1.1

<table>
<thead>
<tr>
<th>Item under technical supervision</th>
<th>Technical supervision by the River Register during manufacture</th>
<th>Technical supervision by the River Register during ship construction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type specimen</td>
<td>serial items</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.13 Electronic chart systems (electronic navigational chart and information display system (ECDIS), ECS)</td>
<td>P</td>
<td>P/OP</td>
</tr>
<tr>
<td>8.14 Underway watch control systems</td>
<td>P</td>
<td>P/OP</td>
</tr>
<tr>
<td>8.15 Radar reflectors</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>8.16 Ship identification and long-range tracking systems</td>
<td>P</td>
<td>P/OP</td>
</tr>
</tbody>
</table>

### 9 Equipment of ships carrying hazardous goods

| .9.1 Cargo systems of chemical carriers and gas carriers, including: cargo hoses, valves, connections of pipelines, safety valves, bellows expansion joints | — | P/OP | — | P | P | P |

### 10 Materials and welding

| 10.1 Metals and their alloys:                                                                 | — | P/OP | K | — | — | — |
| .1 rolled plates and sections                                                                 | — | P/OP | — | — | — | — |
| .2 pipes for boilers, heat exchangers and ship’s pipelines                                   | — | P/OP | — | — | — | — |
| .3 material for rivets and rivets                                                           | — | — | — | — | — | — |
| .4 reinforcing-bar steel for reinforced-concrete shipbuilding                               | — | P/OP | — | — | — | — |
| .5 material for chains and parts of their connection                                        | — | — | — | — | — | — |
| 10.2 Forgings and castings:                                                                 | — | — | — | — | — | — |
| .1 stems, brackets for propeller shafts                                                      | — | P/OP | K | — | — | — |
| .2 rudder stocks of steering nozzles                                                         | — | P/OP | K | — | — | — |
| .3 steering arms, quadrants, parts of rudder blade and steering nozzles                      | — | — | — | — | — | — |
| .4 stern tubes and sleeves                                                                   | — | — | — | — | — | — |
| .5 anchors                                                                                    | — | — | — | — | — | — |
| .6 anchor chains                                                                              | — | P/OP | — | — | — | — |
| .7 towing hooks                                                                               | — | P/OT | — | — | — | — |
| .8 propellers                                                                                 | — | P/OT | — | — | — | — |
| .9 crankshafts, propeller, intermediate and thrust shafts                                     | — | — | — | — | — | — |
| .10 connecting rods                                                                           | — | — | — | — | — | — |
| .11 pinions, wheels and gear shafts of main elements for power plant                         | — | — | — | — | — | — |
| .12 bottoms, manifolds and connections of boilers for heat exchangers and pressure vessels   | — | — | — | — | — | — |
| 10.3 Non-metal materials:                                                                     | — | — | — | — | — | — |
| .1 glass reinforced plastics                                                                   | — | — | — | — | — | — |
| .2 concrete for hull structures and superstructures                                           | — | — | — | — | — | — |
| .3 foams                                                                                      | — | — | — | — | — | — |
| .4 lining materials, lining, framing, floor coverings and coatings of hull structures (corrosion-resistant, antifouling, paint, noise, vibro-absorbing, non-slip, etc.), finishing, etc. | — | — | — | — | — | — |
| .5 photoluminescent, light-reflecting materials, etc.                                         | — | — | — | — | — | — |
| .6 laminated textiles                                                                         | — | — | — | — | — | — |
| .7 materials for filling openings, non-metal, for pipelines passing through A or B type divisions | — | P/OP | — | P | — | — |
| .8 materials for fuel pipelines, their valves and fittings                                    | — | — | — | — | — | — |
| .9 textiles, carpets, furniture                                                                | — | — | — | — | — | — |
### Technical supervision by the River Register during manufacture

<table>
<thead>
<tr>
<th>Item under technical supervision</th>
<th>during manufacture</th>
<th>during ship construction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>type</td>
<td>specimen</td>
</tr>
<tr>
<td>10.4 Insulation materials, fireproof, fireproof compositions, including materials for surfaces and floor coverings with low flame spread properties, paints, varnishes and other finishes, materials restricting flame spreading</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>10.5 Welding materials:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.1 welding electrodes</td>
<td>P</td>
<td>OT</td>
</tr>
<tr>
<td>.2 welding rod, wire flux combination/shielding gas</td>
<td>P</td>
<td>OT</td>
</tr>
<tr>
<td>.3 primary protective coats allowing welding without their removal</td>
<td>P</td>
<td>OT</td>
</tr>
</tbody>
</table>

#### 11 Equipment for prevention of pollution from ships

**11.1 Systems, equipment and arrangements for prevention of pollution by oil:**

1. pumping, delivery and discharge systems of oil-containing water, including automatic monitoring, recording and control systems of oil discharge for oil tanker

#### 11.2 Emergency oil spill localization pack

1. floating boom barrier

#### 11.3 Systems, equipment and devices for prevention of sewage pollution:

1. pumping, delivery and discharge system for sewage

2. collecting tanks.

#### 11.4 Equipment and arrangements for prevention of pollution by garbage:

1. garbage containers

2. incinerators

3. garbage treatment plants
FORM OF NOTICE ON SURVEYOR INVITATION

To Surveyor

________________________ Branch Office

of the Russian River Register

Notice No. _______________________
dated “___” ___________ 20 ___

_______________________________________

(organization name)

Ship, hull No.

Project No.

This notice submits to you the following for check test:

_______________________________________

(production description, content of the work to be submitted)

The operations were performed in accordance with drawings No. _____, specification No. ,
test program No. ,
technical documentation No.

The operations stated in 2.9.1 RTSC, were performed by welders

(full name; Welder Approval Test Certificate No.)

_______________________________________

The submitted production meets the requirements of drawings, technical documentation, processes and fully completed.

Representative of QC service

(signature) (full name)

Conclusion on verification results

_______________________________________

Surveyor of

Branch Office of the River Register

(signature) (full name)

“___” ___________ 20 ___

Conclusion on verification results read and understood:

Representative of QC service

(signature) (full name)

“___” ___________ 20 ___
# LIST OF ITEM CHECK INSPECTIONS AND PROCESS OPERATIONS TO BE SUBMITTED TO THE BRANCH OFFICE (FORM)

<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or technical documentation</th>
<th>Procedure of the item monitoring by the auditor</th>
<th>Drawing up a conclusion by the Surveyor and branding</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

**Notes:**

1. The list shall be drawn up as per the requirements of the Rules, with regard to the Nomenclature, forms and technical supervision methods of this company.

2. Repairable non-replaced parts shall not be stamped by the River Register.

3. Stamp of the River Register:
APPENDIX 4
(informative)

STANDARD LIST OF ITEM CHECK INSPECTIONS
AND PROCESS OPERATIONS TO BE SUBMITTED
TO THE BRANCH OFFICE

The Standard List of the item check tests and process operations (Table A4.1) was prepared as per items under technical supervision and does not establish sequence of their submitting to the Surveyor. Sequence of submitting to the Surveyor shall be determined in each particular case with regard to manufacture, assembly, installation and items under technical supervision and the ship as a whole. The list is to be specified as per the scope of works on construction, modernization, conversion or repair of the ship.

Table A4.1

<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor¹</th>
<th>Drawing up a conclusion by the Surveyor and branding</th>
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<tbody>
<tr>
<td>1 Technical supervision during construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Hull</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1.1.1 Material for metal hull construction        | 1. Certificates for metal-roll and welding materials  
2. Notice on checking the quality of the materials | 1. Checking the quality of the material as per certificates  
2. Check tests, if necessary |                                                   |
| 1.1.2 Material for reinforced hull construction   | 1. Material certificates  
2. Quality control department’s documents for checking the quality of cement, sand, coarse aggregate, water, valve steel and concrete  
3. Notice on checking the quality of the materials | 1. Checking the quality of the materials as per certificates  
2. Checking for documents on selection of the concrete composition and strength / frost-resistance testing of specimens |                                                   |
| 1.1.3 Material for plastic hull construction      | 1. Material certificates  
2. Quality control department’s documents on the sample strength test  
3. Notice on checking the quality of the material | 1. Checking the quality of the material as per certificates  
2. Check tests, if necessary |                                                   |
| (resin, reinforcement materials)                  |                                                                                                   |                                                   |                                                   |
| 1.1.4 Metal hull sections                         | 1. Section drawings  
2. Information on qualification of welders  
3. Flaw detection and tightness test results | 1. Checking for documentation submitted by the QC service  
2. Random check for compliance |                                                   |
<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor¹</th>
<th>Drawing up a conclusion by the Surveyor and branding</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Notice on checking the assembly-welding work</td>
<td>with the design requirements and for assembly and welding workmanship</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 1.1.5 Metal hull units | 1. Unit drawings  
2. Certificates for welding materials and information on qualification of welders  
3. Notice on checking the assembly-welding work  
4. Notice on checking the quality of welds, including non-destructive test of welds  
5. Notice on the watertightness check (if necessary) | 1. Checking for documentation submitted by the QC service  
2. Random check for compliance with the design requirements and for assembly and welding workmanship  
3. Random watertightness test | Entry in the Notice |
| 1.1.6 Metal hull after assembling and welding (before/after launching) | 1. Hull design drawing  
2. Section, unit installation drawings  
3. Testing hull structures, places of navigation equipment fastening to the hull for tightness  
4. Notice on checking main dimensions  
5. Notice on checking the structure after welding  
6. Notice on checking the quality of welds by X- or gamma-ray examination, ultrasonic or other methods  
7. Notice on readiness for launching  
8. Quality control department’s report on the ship inspection after launching  
9. Notice on the hull inspection after launching | 1. Checking for documentation submitted by the QC service  
2. Random check for compliance with the design requirements and for assembly and welding workmanship  
3. In-water hull survey | Entry in the Notice |
| 1.1.7 Reinforced hull and its sections | 1. Design drawing and section drawings  
2. Section datasheets  
3. Technical Acceptance Book of the QC service  
4. Notice on checking the quality of field welded joints  
5. Notice on the watertightness check  
6. Notice on checking main dimensions | 1. Checking for documentation submitted by the QC service  
2. Random check for compliance with the design requirements | Entry in the Notice |
| 1.1.8 Plastic hull and its sections | 7. Notice on the ship inspection before launching  
8. Notice on the ship inspection after launching  
1. Design drawing and section drawings  
2. Section datasheets  
3. Results of material laboratory analyses  
4. Notice on checking the hull after moulding  
5. Notice on the watertightness check | 1. Checking for documentation submitted by the QC service  
2. Random check for compliance with the design requirements | Entry in the Notice |
| 1.1.9 Load line | 1. Drawing of load line  
2. Notice on checking the load line | 1. Checking the proper application of the load line | Entry in the Notice |
| 1.1.10 Hull | 1. Drawings of foundations and rein- | 1. Checking for documentation | Entry in the Notice |
| Description of item under technical supervision foundations and strengthenings | Documents submitted by QC service, confirming the item compliance with the project, standards or specifications | Procedure of item check inspection submitted by the Surveyor\(^1\)  
1. Random check of the workmanship, adherence to production processes  
2. Random check for compliance of devices with the design technical documentation  
3. Checking the availability of brands  
4. Checking for compliance of devices with the design technical documentation  
5. Functional test during running and mooring trials | Drawing up a conclusion by the Surveyor and branding Notice |
|---|---|---|
| 1.2 Ship arrangements | 1. Checking for documentation submitted by the QC service  
2. Random check of the workmanship, adherence to production processes  
3. Checking the availability of brands  
4. Checking for compliance of devices with the design technical documentation  
5. Functional test during running and mooring trials | Entry in the Notice |
| 1.2.1 Steering gears and thrusters | 1. Design technical documentation, device drawings  
2. Certificates for steering machine, thruster, for components and equipment included in arrangements, in case of their individual delivery  
3. Datasheet or file for steering machine, thruster  
4. QC service reports for performed works at intermediate stages (functional inspection), hydraulic test of hydraulic system  
5. Notice on the installation check  
6. Results of installation, mounting clearances, alignment of the drive  
7. Notices of mooring and running trials | Entry in the Notice |
| 1.2.2 Anchor arrangement | 1. Design technical documentation, device drawings  
2. Certificates for windlasses, capstans and anchor winches, anchors, anchor chains and their connection parts, for components and equipment, included in the arrangement in case of their individual delivery  
3. Datasheet or file for windlass, capstan and anchor winch  
4. Datasheets (reports) of anchors, anchor chains and their connection parts, anchor stoppers, device to drop bitter end of the anchor chain or rope, deck and side anchor hawses  
5. Quality control department's reports for performed works at intermediate stages (functional inspection)  
6. Notice on the installation check  
7. Notices of mooring and running trials | Entry in the Notice |
| 1.2.3 Towing gear | 1. Device drawing  
2. Certificate (report) of the towing hook, towing rope  
3. Datasheet or file for towing winch  
4. Notice on the installation check  
5. Notices of mooring and running trials | Entry in the Notices |
| 1.2.4 Coupling | 1. Device drawing | 1. Checking for documentation submitted by the QC service  
2. Random check for compliance with the design requirements and availability of stamps  
3. Functional test during running and mooring trials | Entry in the Notice |
<table>
<thead>
<tr>
<th>Description of item under technical supervision arrangement</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2.5 Cargo handling appliance</td>
<td>1. Device drawing</td>
</tr>
<tr>
<td></td>
<td>2. Certificates for metal-roll and welding materials</td>
</tr>
<tr>
<td></td>
<td>3. Information on qualification of welders</td>
</tr>
<tr>
<td></td>
<td>4. Notice on checking the quality of welded joints</td>
</tr>
<tr>
<td></td>
<td>5. Certificates for chains, ropes, detachable parts</td>
</tr>
<tr>
<td></td>
<td>6. Datasheets or files for machinery and units</td>
</tr>
<tr>
<td></td>
<td>7. Notice on the machinery installation check</td>
</tr>
<tr>
<td></td>
<td>8. Notices of mooring and running trials</td>
</tr>
<tr>
<td>Procedure of item check inspection submitted by the Surveyor</td>
<td>1. Checking for documentation submitted by the QC service</td>
</tr>
<tr>
<td></td>
<td>2. Random check for compliance with the design requirements and availability of stamps</td>
</tr>
<tr>
<td></td>
<td>3. Functional test during running and mooring trials</td>
</tr>
<tr>
<td>Drawing up a conclusion by the Surveyor and branding Notices</td>
<td>Entry in the Notices</td>
</tr>
<tr>
<td>1.2.6 Foil arrangement</td>
<td>1. Drawings</td>
</tr>
<tr>
<td></td>
<td>2. Information on qualification of welders</td>
</tr>
<tr>
<td></td>
<td>3. Certificates of materials and stay bolts</td>
</tr>
<tr>
<td></td>
<td>4. Notice on checking the assembly-welding work</td>
</tr>
<tr>
<td></td>
<td>5. Foil arrangement datasheet</td>
</tr>
<tr>
<td></td>
<td>6. Notice on the installation check</td>
</tr>
<tr>
<td>Procedure of item check inspection submitted by the Surveyor</td>
<td>1. Checking for documentation submitted by the QC service</td>
</tr>
<tr>
<td></td>
<td>2. Random check for compliance with the design requirements</td>
</tr>
<tr>
<td></td>
<td>3. Functional test during running and mooring trials</td>
</tr>
<tr>
<td>Entry in the Notice</td>
<td>Entry in the Notice</td>
</tr>
</tbody>
</table>

**1.3 Life-saving appliances and signal means, navigation equipment and outfit**

| 1.3.1 Life-saving appliances                             | 1. Drawings |
|                                                         | 2. Certificates of ropes, units, davit material |
|                                                         | 3. Datasheets or certificates of lifeboat, liferaft, lifebuoys |
|                                                         | 4. QC service documents on the hydraulic test in the shop |
|                                                         | 5. Datasheet or file of winch |
|                                                         | 6. Notice on the installation check |
|                                                         | 7. Notice on functional test according to the program |
| Procedure of item check inspection submitted by the Surveyor | 1. Checking for documentation submitted by the QC service |
|                                                               | 2. Random check for compliance with the design requirements and availability of stamps |
|                                                               | 3. Check test in operation |
| Entry in the Notice                                        | Entry in the Notice |

| 1.3.2 Signal means and navigation outfit                  | 1. Layout drawing |
|                                                          | 2. Packing list of navigation outfit |
|                                                          | 3. Certificates of lights and signals |
|                                                          | 4. Notice on the installation and completeness check |
|                                                          | 5. Notice on functional test |
| Procedure of item check inspection submitted by the Surveyor | 1. Checking for documentation submitted by the QC service |
|                                                               | 2. Random check for compliance with the design requirements and availability of stamps |
|                                                               | 3. Check test in operation |
| Entry in the Notice                                        | Entry in the Notice |

**1.4 Equipment of ship spaces, crew and passengers protection**

| 1.4.1 Arrangement plans for                                | 1. General arrangement plans for |
|                                                          | 1. Checking for documentation |

Entry in the Notice
<table>
<thead>
<tr>
<th>Description of item under technical supervision and equipment of accommodation and service spaces, passageways, doors, windows, bulwark, handrail</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection submitted by the QC service</th>
<th>Drawing up a conclusion by the Surveyor and branding Notice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 Fire protection</td>
<td>1. Drawings of space isolation and finishing, arrangement and quantity of fire bulkheads, fire-fighting equipment and outfit</td>
<td>1. Checking for documentation submitted by the QC service</td>
<td>Entry in the Notice</td>
</tr>
<tr>
<td>1.5.1 Fire bulkheads, materials used for finishing, isolation of the hull and superstructure, fire-fighting equipment and outfit</td>
<td>2. Certificates of insulation materials and finishes</td>
<td>2. Random check for compliance with the design requirements and installation workmanship</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Notice on checking the compliance of materials, outfit and equipment arrangement with the project</td>
<td>3. Notice on checking the watertightness of doors, windows, hatches</td>
<td></td>
</tr>
<tr>
<td>1.6 Power installation</td>
<td>1. Checking for documents submitted by the QC service</td>
<td>1. Entry in the Notice</td>
<td>1. Entry in the Notice</td>
</tr>
<tr>
<td>1.6.1 Main and auxiliary engines</td>
<td>2. Random check of the workmanship</td>
<td>2. Entry in reports of mooring and running trials</td>
<td>2. Entry in reports of mooring and running trials</td>
</tr>
<tr>
<td></td>
<td>3. Installation check</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>4. Checking the availability of brands</td>
<td></td>
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<tr>
<td></td>
<td>5. Checking for compliance with the design technical documentation and drawings</td>
<td></td>
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<tr>
<td></td>
<td>6. Functional test during running and mooring trials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.6.2 Shafting and propellers</td>
<td>1. Checking for documents submitted by the QC service</td>
<td>1. Entry in the Notice</td>
<td>1. Entry in the Notice</td>
</tr>
<tr>
<td></td>
<td>2. Random check of the workmanship</td>
<td>2. Entry in reports of mooring and running trials</td>
<td>2. Entry in reports of mooring and running trials</td>
</tr>
<tr>
<td></td>
<td>3. Installation check</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>4. Checking the availability of brands</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>5. Checking for compliance with the design technical documentation and drawings</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>6. Functional test during running and mooring trials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.6.3 Boilers, heat exchangers</td>
<td>1. Checking for documents submitted by the QC service</td>
<td>1. Entry in the Notices</td>
<td>1. Entry in the Notices</td>
</tr>
<tr>
<td></td>
<td>2. Random check of the workmanship</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Installation check</td>
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</tr>
<tr>
<td></td>
<td>4. Checking the availability of brands</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Checking for compliance with the design technical documentation and drawings</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>6. Functional test during running and mooring trials</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description of item under technical supervision</td>
<td>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</td>
<td>Procedure of item check inspection by the Surveyor¹</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Checking for documentation submitted by the QC service 2. Checking for compliance with drawings and diagrams, working documentation 3. Random check of installation</td>
<td>Entry in the Notice</td>
<td></td>
</tr>
</tbody>
</table>

### 1.7 Systems and pipelines

<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilge, ballast, liquid cargo, inert gas, smoke generation, ven-</td>
<td>1. Installation drawings and diagrams, working documentation 2. Pipe and valve certificates 3. Datasheets (files) for machinery and equipment (pumps, compressors, filters, etc.)</td>
<td>1. Checking for documentation submitted by the QC service 2. Checking for compliance with drawings and diagrams, working documentation 3. Random check of installation</td>
</tr>
<tr>
<td></td>
<td>1. Checking for documentation submitted by the QC service 2. Checking for compliance with drawings and diagrams, working documentation 3. Random check of installation</td>
<td>Entry in the Notice</td>
</tr>
</tbody>
</table>

²: The Surveyor is responsible for the completion of technical supervision activities.
### Description of item under technical supervision

- Explosion-hazardous spaces, gas-outlet systems of oil tankers;
- Air, gas-outlet, overflow and sounding piping systems ventilation system of the engine room;
- Steam heating system;
- Hydraulic drives of ship machinery;
- Fuel, oil, water cooling, compressed air, feed water, gas-discharging, steam pipeline and blowing systems.

### Documents submitted by QC service, confirming the item compliance with the project, standards or specifications

4. Quality control department's documents on the hydraulic test in the shop
5. Notice on checking the system onboard installation
6. Notice on hydraulic test of the assembled system
7. Notice on functional test of the system and check of the used ship machinery or equipment as intended.

### Procedure of item check inspection by the Surveyor

1.8 Electrical, navigation equipment and radio communication means

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Procedure Details</th>
</tr>
</thead>
</table>
| 1.8.1 Electrical equipment installation and cable laying with fastening | 1. Drawings (plans) for installation, connection of equipment and laying of cable routes with attachment and grounding joints, approved by the River Register  
2. Certificates for installed items  
3. Insulation resistance measurement and grounding check results  
4. Documents confirming the results of controlling the proper installation by the company's personnel |
| 1.8.2 Domestic, household and engineering electric equipment | 1. Drawings (plans) for installation, connection of equipment and laying of cable routes with attachment and grounding joints, approved by the River Register  
2. Insulation resistance measurement and grounding check results  
3. Documents containing the results of braiding and conductor shields |

### Drawing up a conclusion by the Surveyor and branding

1. Checking for documentation submitted by the QC service  
2. Checking for compliance of composition, arrangement, fitting, installation of electric equipment and laying of cables, grounding installation of the electric equipment, cable braiding and conductor shields with the design documentation requirements  
3. Functional test during running and mooring trials  
4. Check test of the system in operation

### Entry in the Notice

1. Notice on checking the system onboard installation  
2. Notice on hydraulic test of the assembled system  
3. Notice on functional test of the system and check of the used ship machinery or equipment as intended.
### Continue of Table A4.1

<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications controlling the proper installation by the company's personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.8.3 Communication means and navigation equipment</td>
<td>1. Drawings (plans) for installation, connection of equipment and laying of cable routes with attachment and grounding joints, approved by the River Register</td>
</tr>
<tr>
<td></td>
<td>2. Certificates for installed items</td>
</tr>
<tr>
<td></td>
<td>3. Insulation resistance measurement and grounding check results</td>
</tr>
<tr>
<td></td>
<td>4. Documents containing the results of controlling the proper installation by the company's personnel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedure of item check inspection by the Surveyor$^1$ with the design documentation requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Checking for documentation submitted by the QC service</td>
</tr>
<tr>
<td>2. Checking for compliance of composition, arrangement, fitting, installation of equipment and laying of cables, grounding installation of the electric equipment, cable braiding and conductor shields with the design documentation requirements</td>
</tr>
<tr>
<td>3. Functional test during running and mooring trials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drawing up a conclusion by the Surveyor and branding</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Entry in the Notice</th>
</tr>
</thead>
</table>

### 1.9 Mooring and running trials

<table>
<thead>
<tr>
<th>1.9.1 Preparation for trials</th>
<th>1. Set of construction documents and documentation for components</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Notice on readiness for tests</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1. Checking for complete set of construction documents and sufficient documentation for components</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Entry in the Notice</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>1.9.2 Mooring trials</th>
<th>1. Mooring trials program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Documents certifying completion of installation and other works at the construction stage of tests, signed by the personnel of the company's QC service, and in cases stated in the List — by the Surveyor;</td>
</tr>
<tr>
<td></td>
<td>3. Schedule of mooring trials approved by the branch</td>
</tr>
<tr>
<td></td>
<td>4. Specification</td>
</tr>
<tr>
<td></td>
<td>5. List of replacements equivalent to the requirements of the Rules and approved technical documentation</td>
</tr>
<tr>
<td></td>
<td>6. Files and datasheets for ship machinery</td>
</tr>
<tr>
<td></td>
<td>7. Documents for devices</td>
</tr>
<tr>
<td></td>
<td>8. Description of the items under technical supervision and maintenance instructions</td>
</tr>
<tr>
<td></td>
<td>9. Test procedures (including simulation) with diagrams of simulators</td>
</tr>
<tr>
<td></td>
<td>10. Notice on mooring trials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1. Checking for documentation submitted by the QC service</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Functional test during mooring trials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entry in the Notice</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>1.9.3 Running trials</th>
<th>1. Running trials program</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2. Quality control department's documents certifying completion of mooring trials</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1. Checking for documentation submitted by the QC service</th>
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<table>
<thead>
<tr>
<th>Entry in the Notice</th>
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</table>

<table>
<thead>
<tr>
<th>3. Schedule of running trials approved by the auditor</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Test procedures</td>
</tr>
<tr>
<td>5. Information on the ship stability and</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. Functional check during running trials</th>
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</table>

<table>
<thead>
<tr>
<th>Entry in the Notice</th>
</tr>
</thead>
</table>
### 2.1 Internal combustion engines

<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor</th>
<th>Drawing up a conclusion by the Surveyor and branding</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.4 Inspection and check sailing</td>
<td>1. List of items to be inspected, indicating scope of works (including internal survey of steam boilers) 2. Quality control department’s document on the inspection results, including: list of the items under technical supervision subject to inspection; description of the detected defects; cause of defects; defect elimination measures; 3. Notice on defect elimination 4. Notice of check sailing (if necessary)</td>
<td>1. Checking for documentation submitted by the QC service 2. Checking the defect elimination 3. Functional test during check sailing</td>
<td>1. Entry in the Notice 2. Issuing documents of the River Register</td>
</tr>
<tr>
<td>Description of item under technical supervision</td>
<td>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</td>
<td>Procedure of item check inspection by the Surveyor¹</td>
<td>Drawing up a conclusion by the Surveyor and branding</td>
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</tr>
</tbody>
</table>
| 2.1.11 Bench tests | 1. Technical documentation 2. Description and maintenance instruc-
<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1. Checking for documentation submitted by the QC service 2. Checking units and parts in scope established by the test procedure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Checking for documentation submitted by the QC service 2. Issuing documents of the River Register 3. Stamping by the River Register</td>
<td></td>
</tr>
</tbody>
</table>

2.1.12 Inspection


2.1.13 Check tests


1. Checking for documentation submitted by the QC service 2. Functional test after assembling and eliminating defects detected during bench tests and inspection in modes prescribed by the program 3. Checking starters, reversing arrangement, alarm and protection system, safety devices, automated device system, rotation speed control system

1. Entry in the Notice 2. Issuing documents of the River Register 3. Stamping by the River Register

2.2 Gears, couplings, shafts and propellers

2.2.1 Reduction gear and disen-gaging coupling cases, gear wheels, reduction gear shafts


1. Checking for documentation submitted by the QC service 2. Random check of the workmanship, adherence to production processes 3. Checking for compliance with drawings

1. Entry in the Notice 2. Issue of documents by the River Register

2.2.2 Assem-

1. Technical documentation

1. Checking for documentation

Entry in the
<table>
<thead>
<tr>
<th>Item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor 1 submitted by the QC service</th>
<th>Drawing up a conclusion by the Surveyor and branding Notice</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.3 Bench tests, inspection, check tests of disengaging coupling gears</td>
<td>Technical documentation for associated equipment in case of its installation on the bench with item under test; Completed file (datasheet) Quality control department's document on performing shop trials (running-in, adjustment, acceptance) Notices on readiness for bench tests, for inspection, for check tests</td>
<td>Checking for documentation submitted by the QC service Functional test in modes prescribed by the program Checking units and parts in scope established by the test procedure for inspection</td>
<td>Entry in the Notice Issuing documents of the River Register Stamping by the River Register</td>
</tr>
<tr>
<td>2.2.4 Thrust intermediate, propeller shafts, shaft bearings, couplings</td>
<td>Part drawings Material certificates Measurement result table Non-destructive test (flaw detection) results Quality control department's documents for performed works at intermediate stages (functional inspection) Datasheet (file) Notice on the check</td>
<td>Checking for documentation submitted by the QC service Random check of the workmanship, adherence to production processes Checking for compliance with drawings</td>
<td>Entry in the Notice Stamping by the River Register (for shafts) Issue of documents by the River Register</td>
</tr>
<tr>
<td>2.2.5 Propellers, bosses, blades, vertical axis propellers, propulsion and steering units, thrusters, assembled steerable propellers and mechanisms, parts and units, delivered for their com-</td>
<td>Part drawings Material certificates Non-destructive test, balancing, testing results Quality control department's documents for performed works at intermediate stages (functional inspection) Measurement result table Datasheet (file) Notice on the check</td>
<td>Checking for documentation submitted by the QC service Random check of the workmanship, adherence to production processes Checking for compliance with drawings</td>
<td>Entry in the Notice Stamping by the River Register (if necessary) Issue of documents by the River Register</td>
</tr>
</tbody>
</table>
## 2.2.6 Shaft liner

<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor¹</th>
<th>Drawing up a conclusion by the Surveyor and branding</th>
</tr>
</thead>
</table>
| fans                                            | 1. Part drawings  
2. Material certificates  
3. Test Results  
4. Quality control department’s documents for performed works at intermediate stages (functional inspection)  
5. Measurement result tables  
6. Notice on the check | 1. Checking for documentation submitted by the QC service  
2. Random check of the workmanship, adherence to production processes  
3. Checking for compliance with drawings | 1. Entry in the Notice  
2. Issue of documents by the River Register² |

## 2.2.7 Stern-tubes and rudder tubes, fixed nozzles, tubes and water-jet channels

<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor¹</th>
<th>Drawing up a conclusion by the Surveyor and branding</th>
</tr>
</thead>
</table>
| fans                                            | 1. Part drawings  
2. Material certificates  
3. Test Results  
4. Quality control department’s documents for performed works at intermediate stages (functional inspection)  
5. Measurement result tables  
6. Notice on the check | 1. Checking for documentation submitted by the QC service  
2. Random check of the workmanship, adherence to production processes  
3. Checking for compliance with drawings | 1. Entry in the Notice  
2. Issue of documents by the River Register² |

## 2.3 Boilers

### 2.3.1 Cases, shells, end plates, tube plates, drums, headers and chambers, flame tubes, boiler stays, burning units, economizers, steam collectors, superheaters

<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor¹</th>
<th>Drawing up a conclusion by the Surveyor and branding</th>
</tr>
</thead>
</table>
| fans                                            | 1. Drawings of units and parts  
2. Certificates for metal-roll and welding materials  
3. Process  
4. Information on qualification of welders  
5. Control bar test results and radiographies (if necessary)  
6. Quality control department’s documents for performed works at intermediate stages (functional inspection)  
7. Quality control department’s documents on hydraulic test of parts and units, heat treatment, on weld quality control  
8. Notice on the check | 1. Checking for documentation submitted by the QC service  
2. Checking the availability of brands and for compliance of marking with documents, confirming the material quality  
3. Random check of the workmanship, adherence to production processes  
4. Checking for compliance with drawings | 1. Entry in the Notice  
2. Issue of documents by the River Register² |

### 2.3.2 Boiler fittings

<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor¹</th>
<th>Drawing up a conclusion by the Surveyor and branding</th>
</tr>
</thead>
</table>
| fans                                            | 1. Documents for valves  
2. Notices on readiness for hydraulic tests | 1. Checking for documentation submitted by the QC service  
2. Random inspection  
3. Hydraulic tests of valve, visual inspection before and after the test | 1. Entry in the Notice  
2. Issue of documents by the River Register² |

### 2.3.3 Boiler assembly

**Internal survey and hydraulic test of boilers. Steam test of the boiler (if necessary)**

<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor¹</th>
<th>Drawing up a conclusion by the Surveyor and branding</th>
</tr>
</thead>
</table>
| fans                                            | 1. Technical documentation  
2. Boiler datasheet (file)  
3. Boiler drawings (longitudinal, transversal sections, etc.)  
4. Documentation for components  
5. Information on qualification of welders  
6. Quality control department’s documents for performed works at intermediate stages (functional inspection) | 1. Checking for documentation submitted by the QC service  
2. Random check of the boiler assembly workmanship  
3. Internal survey, hydraulic tests, visual inspection | 1 Entry in the Notice  
2. Stamping by the River Register  
3. Issue of documents by the River Register² |
<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor¹</th>
<th>Drawing up a conclusion by the Surveyor and branding</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Notices on readiness in the assembled condition without valves for internal survey, hydraulic test, steam test (if necessary), visual inspection 8. Measurement result tables for flame tubes before and after the hydraulic test 9. Notice on the check</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2.4 Pressure vessels, heat exchangers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4.2 Fittings</td>
<td>1. Documents for valves and head 2. Notices on readiness for hydraulic tests</td>
<td>1. Checking for documentation submitted by the QC service 2. Random inspection 3. Hydraulic tests of valve, visual inspection before and after the test</td>
<td>1. Entry in the Notice 2. Issue of documents by the River Register²</td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2.5 Electric equipment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Description of item under technical supervision

Documents submitted by QC service, confirming the item compliance with the project, standards or specifications

<table>
<thead>
<tr>
<th>Procedure of item check inspection by the Surveyor</th>
<th>Drawing up a conclusion by the Surveyor and branding Register</th>
<th>Issue of documents by the River Register</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Inspection and check of units and parts</td>
<td>1. Checking for documentation submitted by the quality control department and its agreement deadline</td>
<td>1. Entry in the Notice</td>
</tr>
<tr>
<td>3. Functional tests</td>
<td>2. Inspection and check of units and parts</td>
<td>2. Stamping by the River Register</td>
</tr>
<tr>
<td></td>
<td>3. Functional tests</td>
<td>3. Issue of documents by the River Register</td>
</tr>
</tbody>
</table>

### 2.5.2 Electric distribution systems (main and emergency switchboards, grouped boards, control and alarm boards and panels, other boards)

1. Technical documentation  
2. Test program  
3. Documents for components  
4. Acceptance documents of the quality control document  
5. Notice

1. Checking for documentation submitted by the quality control department and its agreement deadline  
2. Inspection and check of units and parts  
3. Functional tests

1. Entry in the Notice  
2. Stamping by the River Register  
3. Issue of documents by the River Register

### 2.5.3 Essential electric drives, storage batteries, transformers, converters, lighting equipment, electrical machine telegraphs, rudder / CPP blade position indicators, shaft line tachometers, telephone apparatus, fire detection alarm system and fire smothering system release alarm, heaters, cable items

1. Technical documentation  
2. Test program  
3. Documents for components  
4. Acceptance documents of the quality control document  
5. Notice

1. Checking for documentation submitted by the quality control department and its agreement deadline  
2. Inspection and check of units and parts  
3. Participation in testing

1. Entry in the Notice  
2. Issue of documents by the River Register

### 2.6 Deck machinery and ship auxiliary equipment

2.6.1 Steering machines, thrusters, blowers (for air-cushion ships), anchor and towing machinery (capstans, windlasses, winches), air compressors, towing winches, winches of

1. Technical documentation  
2. Datasheets, files  
3. Test program  
4. River Register Certificates for components (when required by the Rules)  
5. Notice

1. Checking for documentation submitted by the quality control department and its agreement deadline  
2. Inspection and check of units and parts  
3. Functional tests

1. Entry in the Notice  
2. Issue of documents by the River Register  
3. Stamping by the River Register
## Continuation of Table A4.1

<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor</th>
<th>Drawing up a conclusion by the Surveyor and branding</th>
</tr>
</thead>
</table>
| 2.6.2 End and side automatic coupling devices    | 1. Technical documentation  
2. Datasheets, files  
3. Test program  
4. Notice | 1. Checking materials as per their file  
2. Inspection and check of parts and units  
3. Participation in bench tests | 1. Entry in the Notice  
2. Entry in the file  
3. Stamping by the River Register  
4. Issue of documents by the River Register |

### 2.7 Units and parts of ship’s arrangements and outfit

| 2.7.1 Lifeboats and devices | 1. Technical documentation  
2. Documents for materials  
3. Test programs  
4. Notice | 1 Checking for documentation submitted by the quality control department  
2. Inspection and check  
3. Participation in testing | 1. Entry in the Notice  
2. Issuing documents of the River Register  
3. Stamping by the River Register |
|-------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------|---------------------------------------------------|
| 2.7.2 Lifebuoys, lifejackets, life vests | 1. Technical documentation  
2. Documents for materials  
3. Test programs  
4. Acceptance documents of the quality control document  
5. Notice | 1. Checking for documentation submitted by the QC service  
2. Inspection and check  
3. Participation in testing | 1. Entry in the Notice  
2. Issuing documents of the River Register |
| 2.7.3 Navigation lights  | 1. Technical documentation  
2. Test program  
3. Documents confirming the results of testing the manufactured items by the company’s personnel  
4. Notice | 1. Checking for documentation submitted by the QC service  
2. Inspection and check of torches  
3. Functional tests during standard tests of serial specimens | 1. Entry in the Notice  
2. Issuing documents of the River Register |
| 2.7.4 Rudders, nozzles, stocks of rudders and nozzles | 1. Technical documentation  
2. Documents for materials  
3. Report on execution of measurements  
4. Notice | 1. Checking for documentation submitted by the QC service  
2. Inspection and check  
3. Participation in testing | 1. Entry in the Report  
2. Stamping by the River Register  
3. Issue of documents by the River Register |
| 2.7.5 Anchors, anchor chains | 1. Technical documentation  
2. Documents for materials  
3. Notice | 1. Checking for documentation submitted by the QC service  
2. Inspection and check  
3. Participation in testing | 1. Entry in the Notice  
2. Issue of documents by the River Register |
<table>
<thead>
<tr>
<th>Description of item under technical supervision</th>
<th>Documents submitted by QC service, confirming the item compliance with the project, standards or specifications</th>
<th>Procedure of item check inspection by the Surveyor¹</th>
<th>Drawing up a conclusion by the Surveyor and branding</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7.6 Towing hooks and arches</td>
<td>1. Technical documentation</td>
<td>1. Checking for documentation submitted by the QC service</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Documents for materials</td>
<td>2. Inspection and check</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Notice</td>
<td>3. Participation in testing</td>
<td></td>
</tr>
<tr>
<td>2.7.6 Towing hooks and arches</td>
<td>1. Technical documentation</td>
<td>1. Entry in the Notice</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Documents for materials</td>
<td>2. Issue of documents by the River Register</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.8 Radio communication means and navigation equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.8.1 Communication means and navigation equipment</td>
</tr>
<tr>
<td>1. Technical documentation</td>
</tr>
<tr>
<td>2. Acceptance documents of the quality control document</td>
</tr>
<tr>
<td>3. Notice on the check</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

¹ Scope of technical supervision by the auditor is determined by these Rules.
² When manufacturing items to be delivered to other companies.
### CONSTRUCTION BOOK FORM

<table>
<thead>
<tr>
<th>No.</th>
<th>Description of the item under test (materials, assemblies, parts, etc.)</th>
<th>Control notice</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>production foreman</td>
<td>Date</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

### FORM OF TECHNICAL SUPERVISION RECORD BOOK

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Project number, ship hull number</th>
<th>Surveyor's comment</th>
<th>Company's measures</th>
<th>Entry of the QC service on the comment elimination</th>
<th>Surveyor's entry on the comment elimination</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
TESTING PROCEDURE FOR WELDERS' PERMIT

1. Tests for receiving manual and semi-automatic welding permit shall be performed according to Table A7.1 and Fig. A7.1-1 to A7.1-8.

2. Tests for receiving automatic welding permit shall be performed according to Table A7.2.

Table A7.1

<table>
<thead>
<tr>
<th>Item, type of construction</th>
<th>Thickness, mm</th>
<th>Welding position</th>
<th>Type of test assembly</th>
<th>Type of inspection and quality estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>visual</td>
<td>Radiographic (ultrasonic) (see 8.3.3 Part X RCCS)</td>
</tr>
<tr>
<td>Plates</td>
<td>≤5</td>
<td>Horizontal</td>
<td>$P_{d} + P_{2h}$</td>
<td>mark III</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All</td>
<td>$P_{d} + (P_{b,v} + P_{10}) + P_{2v}$</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All</td>
<td>$P_{d} + (P_{b,v} + P_{10}) + P_{2v}$</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>6 to 25</td>
<td>Horizontal</td>
<td>$P_{d} + P_{2h}$</td>
<td>mark III</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All</td>
<td>$P_{d} + (P_{b,v} + P_{10}) + P_{2v}$</td>
<td>mark II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All</td>
<td>$P_{d} + (P_{b,v} + P_{10}) + P_{2v}$</td>
<td>mark II</td>
</tr>
<tr>
<td></td>
<td>&gt;25</td>
<td>Horizontal</td>
<td>$P_{d} + P_{2h}$</td>
<td>mark III</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All</td>
<td>$P_{d} + (P_{b,v} + P_{10}) + P_{2v}$</td>
<td>mark II</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All</td>
<td>$P_{d} + (P_{b,v} + P_{10}) + P_{2v}$</td>
<td>mark II</td>
</tr>
<tr>
<td>Tubes</td>
<td>≤5</td>
<td>Horizontal</td>
<td>$P_{d} + P_{3}$</td>
<td>mark III</td>
</tr>
<tr>
<td></td>
<td>&gt;5</td>
<td>Horizontal</td>
<td>$P_{d} + P_{3}$</td>
<td>mark III</td>
</tr>
<tr>
<td>Pressure vessels</td>
<td>(0.5 – 1.5)t</td>
<td>All</td>
<td>$P_{d} + (P_{b,v} + P_{10})$</td>
<td>mark II</td>
</tr>
<tr>
<td>Plates (piping)</td>
<td>(0.5 – 1.5)t</td>
<td>All</td>
<td>$P_{d} + (P_{b,v} + P_{10})$</td>
<td>mark II</td>
</tr>
<tr>
<td>Welding-up of faults in</td>
<td>—</td>
<td>Horizontal</td>
<td>$P_{d}$</td>
<td>mark III</td>
</tr>
<tr>
<td>forgings and castings</td>
<td></td>
<td></td>
<td>$P_{d}$</td>
<td>mark III</td>
</tr>
</tbody>
</table>
For welded joints made by fillet welding electrodes.

According to Fig. A7.1-1 to A7.1-8: $P_{1d}$ — butt joints in horizontal position; $P_{1v}$ — butt joints in vertical position; $P_{1h-v}$ — horizontal butt joints in vertical plane; $P_{10}$ — butt joints in overhead position; $P_{2h}$ — angular joints in horizontal position; $P_{2v}$ — angular joints in vertical position; $P_{20}$ — angular joints in overhead position.

May be supplemented by dye-penetrant or magnetic particle methods.

The River Register determines test assembly areas from which test specimens shall be machined.

The test assembly diameter is determined proceeding from the structure type.

For obtaining weld approval in piping constructions.

Note: $t$ — sample thickness.

Fig. A7.1-1. Sample $P_1$

Fig. A7.1-2. Sample $P_2$

Fig. A7.1-3. Sample $P_3$
Fig. A7.1-4. Sample $P_a$
Fig. A7.1-5. Sample $P_s$
Fig. A7.1-6. Sample $P_u$
Appendix 7

Fig. A7.1-7. Sample $P_7$

Fixed vertical pipe

Fig. A7.1-8. Sample $P_8$

Recommended preparation of welds $C_1$ and $C_2$
### Table A7.2

**Scope of tests for receiving automatic welding permit**

<table>
<thead>
<tr>
<th>Item</th>
<th>Type of test assembly</th>
<th>Thickness or diameter, mm</th>
<th>Type of inspection and quality estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Visual&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Plates</td>
<td></td>
<td>(0,5÷2) t</td>
<td>$P_t$</td>
</tr>
<tr>
<td>Pipes</td>
<td></td>
<td>$\geq 0.5D$ (0,5÷2) t</td>
<td>$P_3$ ($P_6$)</td>
</tr>
</tbody>
</table>

<sup>1</sup> May be supplemented by dye-penetrant or magnetic particle methods.

<sup>2</sup> River Register determines sections of samples for cutting sample manufacture material.

**Notes:**
1. $t$ — thickness of the test assembly, $D$ — diameter of the test assembly.
2. To be chosen according to the welding procedure and the availability of automatic welding equipment.
STANDARD LIST OF TECHNICAL DOCUMENTATION SUBMITTED TO THE RIVER REGISTER FOR APPROVAL

This Appendix determines the lists of technical documentation submitted to the River Register for approval.

The specified lists are generic and determined by design organization (manufacturer) on agreement with the River Register depending on the design features of ships and ships' elements.

The operating documentation for the ship machinery construction items, electrical, radio and navigation equipment is submitted with due regard to the Nomenclature. The documentation scope is determined by the design organization on agreement with the Branch office.

The documentation marked with * and all the operating documents shall be stamped APPROVED. The documentation not marked with * in Sections 1 to 5 of this Appendix shall be stamped TAKEN INTO CONSIDERATION.

1 Technical design

1.1 The technical design of a ship shall include the following general design documents:

.1 list of technical design documents;
.2 explanatory note to the design;
.3* specification including Section for prevention of pollution from ships;
.4* list of equivalents to the requirements of the Rules (if admitted) with substantiation;
.5* program and method of acceptance trials for the prototype ship of the series (submitted after approval of engineering design);
.6* loading, unloading and ballasting instructions for a cargo ship (submitted after clarifying the mass loads while detailed designing);
.7* stability and floodability data (submitted after clarifying the mass loads while detailed designing);
.8* general arrangement plan indicating the technical means, devices and equipment:
   side view;
   inboard profile specifying the watertight bulkheads, decks, platforms and other elements;
   plans of decks, holds, bridges, platforms and other elements;
.9* general arrangement plan of equipment in wheelhouse;
.10 arrangement plan of explosion and fire hazardous areas and rooms (if any);
.11 lines drawing of a ship's hull;
.12 calculations of mass loads and centre of gravity position, trim and initial stability for various loading conditions;
.13 static and dynamic stability diagrams with table of heeling and capsizing moments and heel angles for various loading conditions (calculation of stability diagram arms may be omitted) stability assessment for various loading conditions initial data tables when calculating by means of software applications;
.14 calculation of ships floodability in accordance with the requirements of 4.2 Part I RCCS, initial data tables when calculating by means of software applications;
.15 freeboard calculations;
1.6 calculations of ship maneuverability including maneuverability table;
1.7 calculations of gross tonnage;
1.8 list of materials, components and equipment to be delivered with documents specified in 2.2.6.

1.2 The technical design shall contain the following hull documentation:
1.1 midship section and hull cross-sections with the main framing members;
1.2* design drawing of hull and superstructures engaged in global bending, with framing table;
1.3* shell expansion for ships with sophisticated hull shape;
1.4 calculations for selection of design and dimensions of the hull members, initial data tables for calculating by means of software applications;
1.5 calculations of global and local vibration;
1.6* calculation of strength and stability of hull members (for single-hull steel ships and catamarans over 50 m in length, ships with hull made of light alloys, hydrofoils, hovercraft and ships with plastic hull);
1.7 initial data table for calculating by means of software applications;
1.8* calculations of hull strength (for ships with reinforced-concrete hull);
1.9* calculations of transverse ship strength (for undecked cargo ships and ships with ratio $B/H$ exceeding the prescribed value);
1.10* general view of ship hatchway cover with strength calculations of hatchway covers and main drive components;
1.11* calculation of hull global strength at the end of the ship’s service life;
1.12* calculation of icebreakers’ ice strength.

1.3 The engineering design shall contain the following documentation for equipment and room insulation:
1.1* arrangement plan of signal means and navigation lights;
1.2* selection of device elements and outfit items according to the Rules, or calculations substantiating the selection of these elements;
1.3* general arrangement plan of new-type devices.

1.4 The technical design shall contain the following documentation for ship arrangements:
1.1* arrangement plan of signal means and navigation lights;
1.2* shafting with stern-tube, propeller (steering thruster), shafts and couplings;
1.3 calculation of shafting (including torsional vibrations), propeller and selection of shafting elements according to the Rules;
1.4* schematic diagrams (indicating operating parameters, diameter, pipe wall thickness, pipe materials, valves and fittings) of cooling, oil, fuel supply, start air, gas exhaust (may be shown on the general view of room), steam pipeline, feed and condensate systems.

1.5 The technical design shall contain the following documentation for power unit and systems:
1.1 arrangement plan of the main and auxiliary engines and equipment in the machinery spaces and central control station rooms with indication of the passages and escape routes according to 1.9 Part IV RCCS;
1.2* shafting with stern-tube, propeller (steering thruster), shafts and couplings.
1.3* schematic diagrams (indicating operating parameters, diameter, pipe wall thickness, pipe materials, valves and fittings) of ventilation, fire-fighting, drainage, ballast, bilge oily water removal, oil heating systems; hydraulic pneumatic actuator system of auxiliary technical means and deck mechanisms; liquefied gas domestic facility; air, overflow and measuring pipelines; compressed air system; oily water pumping, delivery and discharge system;
Appendix 8

2. calculation of ship's ventilation, firefighting, bilge, ballast, compressed and start air systems;
3. calculation of tanks capacity of the oily water pumping, delivery and discharge systems.

1.7 The engineering design shall contain the following documentation for refrigerating plant:
1. general arrangement plan of refrigerating plant;
2. schematic diagrams of coolant, coolant fluid, ventilation, air cooling and cooling water systems, and control, monitoring, alarm and protection systems;
3. main calculations for refrigerating plant.

1.8 The technical design shall contain the following documentation for oil tankers (in addition to the documents stated in 1.5 and 1.6 of this Appendix):
1. arrangement plan of equipment in pump room;
2. schematic diagrams of cargo handling, stripping, inert gas and vent systems.

1.9 The technical design shall contain the following documentation for automation:
1. arrangement plan of the main remote control and automation means (control stations and consoles);
2. schematic diagrams and organizational charts of the remote control, automation and warning alarm systems of the main ship's technical means and systems with indication of the power supply sources;
3. schematic diagrams of fluid level alarm of the oily and sewage waters pumping, delivery and discharge systems.

1.10 The technical design shall contain the following documentation for electrical equipment:
1. circuit diagrams of electrical power distribution from main and emergency sources: power mains, lighting (to section switchboards);
2. circuit diagrams of main and emergency switchboards, control desks and switchboards of non-standard design;
3. circuit diagrams of electric drives for ship equipment stated in 5.3.1, 7.5 to 7.10 and 4.2 Table 4.5.2 Part VI RCCS;
4. circuit diagrams of main and emergency lighting mains;
5. circuit diagrams of navigation and signal lights;
6. circuit diagrams of general and fire alarms;
7. circuit diagrams of the main current, excitation, control, monitoring, signal, protection and interlock of electric propulsion plant;
8. earthing diagram for ships with non-conductive hulls;
9. diagram of lightning conductors (may be shown on ship's general view);
10. calculation of the required power plant capacity to ensure all ship's operation modes, substantiation for selection of generator quantity and capacity as well as calculation of capacity of emergency power supply sources;
11. calculation of cable cross-sections with indication of their grades, currents and protection degree;
12. calculation of short-circuit currents and voltage changes;
13. calculation of dynamic and thermal capacity at short circuit (at nominal power of generator or parallel operating generators over 100 kW) for buses, communication and protection hardware of the main distribution switchboard and cables of essential devices;
14. lightning protection calculation;
15. list of measures to ensure electrostatic and galvanic sparking safety (for oil tankers).

1.11 The technical design shall contain the following documentation for communication and navigational equipment
1. electric block diagram of navigational equipment, radio communication means, public address system, voice communication means, onboard internal communication equipment, receivers of broadcasting station signals (audio and video broadcasting stations) and broadcasting satellite service;
2. drawings (not less than two views) showing arrangement of equipment in rooms.
intended for the installation of radio and navigational equipment;

.3 arrangement drawings of antennas (three views) may be shown on ship’s general view;

.4 calculation of MF/HF antenna parameters and radio range;

.5 arrangement drawing of the main / steering (reserve) marine compass.

1.12 The technical design shall contain the following documentation for equipment for prevention of pollution from ships:

.1 plans of arrangement of equipment and devices for the prevention of pollution from ships;

.2 calculations of the navigation autonomy due to ecological safety conditions;

.3 schematic diagrams of oily and sewage waters pumping, delivery and discharge systems including collecting tanks and standard discharge connections;

.4 technical description and operation principle of water supply and discharge systems;

.5 onboard test program of the equipment;

.6 diagram of sealing stop fittings of overboard discharge system for oil-containing and sewage water;

.7 diagram of collection system for leaking fuel and oil;

.8 for oil tankers (except for documents stated in 1.12.1 to 1.12.7) the following documents shall be submitted:

- calculations of the capacity of cargo, settling and pure ballast tanks;
- the diagram of location of all tanks on board of a ship;
- the diagram of compartments subdivision and emergency stability calculations;
- the diagram of emergency oil pumping;
- the diagram of location discharge outlets;
- the diagram of oil residues pumping system to the settling tank;
- operating manual for tanks intended for pure ballast (if applicable);
- operating manual for the automatic monitoring control system for ballast and washing water discharge;

.9 operating manual for emergency oil spill localisation pack.

2 Technical documentation for ship conversion, modernization, re-classification and repair

2.1 The technical documentation shall be submitted for those parts of hull, ship’s technical means and equipment which subject to conversion, modernization, restoration or repair.

If the characteristics of strength, stability, manoeuvrability, etc. are changed due to ship conversion, the correspondent calculations or substantiations shall be submitted.

2.2 When changing the hull design, converting or modernizing a ship, the technical documentation in a scope specified for the ship under construction (see 1) shall be submitted to the River Register.

2.3 In order to re-classify a ship, the following documentation shall be submitted to the River Register:

.1 explanatory note with substantiations for re-classification;

.2 analysis of ship compliance with the RCCS requirements for a new class for all ship elements;

.3 list of equivalents to the Rules requirements for a new class, with substantiations;

.4 analysis for compliance with the requirements of international normative documents (for ships engaged on international voyages). The following documents shall be submitted for reference:

- .5 supplement to specification;
- .6 test program;
- .7 instruction on loading and unloading or related supplement;
- .8 stability and floodability data or related supplement;
- .9 global and local strength calculations;
- .10 additional calculations for selection of reinforcements and hull scantlings;
- .11 freeboard calculation and load line drawing;
- .12 substantiations confirming the capability to operate the main engines, propulsion
and steering unit and ship’s power plant without degradation of their technical characteristics determined by the delivery documentation and the Rules;

.13 technical documentation for ship reclassification related to hull reinforcement, further equipment and outfit including general arrangement drawings;

.14 calculations of ship maneuverability including maneuverability table;

.15 special standard values of residual thicknesses and local residual deformations that differ from those prescribed by the RSSS;

.16 technical documentation from the list specified in 1.12 when such a documentation is required due to installation of new equipment for prevention of pollution from ships, the availability of which prescribed by the RSSS, if an inland navigation ship is reclassified to О-ПР, М-ПР or М-СП class.

3 Project of ship passage outside the specified navigation area

3.1 The ship passage project includes:

.1 explanatory note with indication of passage area and conditions, description of measures for ensuring the passage safety (including organizational measures);

.2 calculation of strength, stability and freeboard required by the Rules for passage area and conditions;

.3 drawings of hull and superstructure reinforcements;

.4* drawings and diagrams of opening covers in hull and superstructures as well as installation of structures to improve seakeeping (rakes, protection of superstructures, wheelhouses and other technical solutions for ship conversion);

.5* drawings of towing and/or pushing arrangements, arrangement plan of towing bridle;

.6* arrangement drawings of navigation lights and daytime signals of the towed ship;

.7 description of power plant, electrical, radio and navigation equipment;

.8 description of steering, anchor, mooring arrangements, fire protection, life-saving appliances and signal means;

.9* list of emergency outfit and its arrangement plan;

.10* guidance to the master of the passed ship or tugboat including the specified weather limits, instructions on ship ballasting, consumption of ship’s stores and damage control in case of emergency.

4 Technical documentation for preparing a ship for transportation of bulky and/or heavyweight cargoes

4.1 The documentation shall include:

.1* arrangement plans of the transported cargo with indication of dimensions, centre of gravity coordinates and weight of each cargo unit, fastening methods and means (distance bars, stops, lashes, etc.);

.2* arrangement plans of navigation lights and lightening conductor, if they are subjected to alterations;

.3* reinforcement drawings — bulkheads and partial bulkheads, trusses, web girders, support structures distributing the load from cargo; leveling platings, arrangements for prevention of cargo shift when rolling and mooring;

.4 additional calculations of global and local strength of a ship and specific loads on support structures with regard to load distribution irregularity when handling and transporting the cargo. When determining the local loads from the concentrated cargoes inertial loads due to rolling are considered;

.5 calculations of anchoring strength and related forces with regard to inertia forces when rolling and mooring. The anchoring may be omitted, if friction force exceeds shearing forces. Based on the strength calculations the permissible pressure limit on support surface of the cargo or along the leveling platings is determined;

.6* additional guidance on handling the equipment developed on basis of the strength and stability calculation results indicating the capability and requirement of ballasting as well as indicating the sequence, method and
diagram of handling with drawings of additional structures;
7. additional stability data drawn up based on calculation of stability, floodability and trimming. When checking the emergency stability, the requirements of Part II RCCS shall be met;
8. guidance to the master for ensuring the cargo transportation safety including organizational measures, transportation route, specified weather limits.

5 Technical documentation

5.1 The technical documentation for internal combustion engines and reduction gears shall include:
1. specifications;
2. general view drawings and essential component drawings;
3. schematic diagrams of fuel, lubricating, cooling, starting, electric equipment, remote control, automation, gas control alarm and protection systems;
4. programs of bench tests and test to verify engine exhaust gas compliance with normative values of harmful substances and opacity;
5. strength calculations of essential engine components, calculations of crankcase ventilation arrangement and safety valves, data on the maximum and average specific pressures in bearings (main, crankpin, thrust bearings), strength calculation of shafts and reduction gear tooth, calculation of reduction gear bearings, calculation of torsional vibrations in links of the planned torsional system;
6. technical data sheet of emissions (not applicable to reduction gears).

5.2 The technical documentation for the retrofitted engines shall include:
1. specifications for the retrofitted engine;
2. general view drawing of the converted engine with all assemblies and components included in conversion work scope;
3. test program;
4. copy of specifications developed and issued by the Manufacturer of basic engine to be retrofitted;
5. technical data sheet of emissions.

5.3 The technical documentation for steam and water boilers shall include:
1. specifications;
2. assembly drawing with longitudinal and transverse sections in scale not less than 1:10 and connections in scale of not less than 1:2;
3. calculation of boiler strength in accordance with the Strength Calculation Manual for Boilers, Heat Exchangers and Pressure Vessels;
4. calculation of safety valve cross-sections;
5. assembly and welding procedures;
6. schematic diagrams of warning alarm and protection automation;
7. program of testing a specimen and serial item.

5.4 The technical documentation for cargo handling gears shall include:
1. specifications;
2. general view drawings of cargo handling gear, bearing metal structures, machinery;
3. kinematic diagram;
4. schematic diagrams of electrical equipment;
5. diagrams of safety arrangements and means (describing their operation principle);
6. calculation of forces and stresses in components of the cargo handling gears;
7. program of testing a specimen and serial item.

5.5 The technical documentation for coupling equipment shall include:
1. specifications;
2. bench test program;
3. assembly drawings of lock and tensioning station;
4. essential component drawings;
5. calculation of components strength.

5.6 The technical documentation for deck machinery and ship auxiliary equipment shall include:
1. specifications;
2. general arrangement drawings;
3. assembly drawings of essential components;
4* schematic diagrams of control, gas control alarm automation and protection;
5* calculations agreed in the Rules;
6* program of testing a specimen and serial item.

5.7 The technical documentation for steerable and fixed propellers shall include:
1* specifications;
2 general arrangement drawings;
3 assembly drawings of essential components;
4* schematic diagrams of electrical equipment, hydraulic, lubricating, alarm and protection systems, kinematic diagram (if they are not presented in specifications);
5* calculation of input (primary) and output shafts, gear drives, calculation and selection of bearings;
6* program of testing a specimen and serial item.

5.8 The technical documentation for gear and hydraulic drives shall include:
1* specifications;
2* general view drawings with sections;
3 kinematic diagram;
4 calculations agreed in the Rules;
5 schematic diagram of control, gas control alarm automation and protection;
6* program of testing a specimen and serial item.

5.9 The technical documentation for electrical equipment shall include:
1* specifications;
2* electric schematic diagrams, diagrams of automation, gas control alarm and protection;
3 calculations agreed in the Rules;
4* program of testing a specimen and serial item.

5.10 The technical documentation for communication and navigation equipment shall include:
1* specifications;
2* program of testing a specimen and serial item;
3 diagrams.

5.11 The technical documentation for equipment for prevention of pollution from ships shall include:
For filtering equipment:
1 technical description and operation principle of separator or filter, operating and maintenance manual;
2* specifications;
3* general arrangement drawings with sections (separator or filter design with main dimensions, used materials and coatings);
4 assembly drawings of pumps and other devices being a part of filtering equipment;
5 drawings of welded joints (in casings, base frame and other parts) containing welding data;
6 diagrams of maintenance systems within the filtering installation;
7* principal electrical circuit of the installation as well as control, adjustment, monitoring, alarm and safety diagram;
8 program of testing a specimen and serial item;
9 list of the essential elements with mechanical characteristics of the material and test hydraulic pressure;

For alarm device:
10 technical description indicating the operation principle and technical parameters, operating manual, reliability data;
11* specifications;
12* general arrangement drawings;
13* specification indicating used materials and assembling parts;
14* principal and function diagrams;
15* program of testing a specimen and serial item;

For automatic monitoring and control systems for ballast and washing water discharge:
16 technical description indicating the operation principle and technical parameters, operating manual, and reliability data;
17* specifications;
18* general arrangement drawings;
.19* specification indicating used materials and assembling parts;
.20* principal and function diagrams;
.21* drawings of fittings for emergency shut-off the discharge;

For sewage treatment plant:
.22 technical description and operating manual;
.23* specifications;
.24* general arrangement drawings with sections (the design, the main dimensions, used materials and coatings);
.25* principal electrical circuit;
.26* control, adjustment, monitoring, alarm and safety diagram;
.27* program of testing a specimen and serial item;

For incinerator:
.28 technical description and operating manual;
.29* specifications;
.30* general arrangement drawings with sections (the design, the main dimensions, used materials and coatings);
.31* general drawing arrangement of atomisers;
.32 drawings of loading unit;
.33 diagram of fuel system within the installation;
.34 principal electrical circuit;
.35 control, adjustment, monitoring, alarm and safety diagram;
.36 program of testing a specimen and serial item;

For garbage container (removable):
.37 technical description;
.38* general arrangement drawings with sections (the design, the main dimensions, used materials and coatings);

For garbage treatment plant:
.39 technical description and operating manual;
.40* specifications;
.41 general arrangement drawings with sections (the design, the main dimensions, used materials and coatings);
.42 principal electrical circuit.

6 Operating documentation for a ship to be agreed with the Branch Office

6.1 The following drawings and documents for hull and superstructure are submitted to the Branch office for approval:
.1 midship section and cross-sections;
.2 design drawing of hull with framing table;
.3 design drawing of superstructures;
Note: Hereinafter the "superstructures" means superstructures and wheelhouses engaged in global bending of a ship.
.4 shell expansion of hull and inner sides;
.5 deck and inner bottom plating;
.6 diagram book of standard assemblies and structures for hull and superstructure;
.7 welding table;
.8 diagram of welds radiographic inspection;
.9 stems, keels, propeller brackets, stern-tubes, sleeves, fixed nozzles;
.10 two-dimensional sections of decks, platforms, bottom sides, longitudinal and transverse watertight bulkheads, inner sides and double bottom plating, except for identical sections within the area of cylindrical section;
.11 three-dimensional sections of double bottom, extremities of ship and superstructures, except for identical sections of the double bottom and double sides within the area of cylindrical section;
.12 blocks of ship hull;
.13 foundations under the main engines, thrust bearing, coupling equipment, cargo cranes;
.14 cargo, deck, escape hatches and skylights and their covers, watertight doors, windows, scuttles and other hull fittings according to the Nomenclature;
.15 bulwarks and guard rails, metal fender bars, pushing stops, coupling girders;
.16 arrangement plan of manholes, ladders, external exits indicating the coaming height and overall dimensions;
.17 arrangement plan of bottom inlets and scuppers;
.18 fire-proof bulkheads and doors;
.19 guidance and diagram of hull tightness test;
.20 assembly and welding procedures for manufacturing standard and sophisticated assemblies, sections, blocks, procedure for hull assembly on slipway;
.21 hull and superstructure blocking plan;
.22 load line and draught scales;
.23 diagram of process cut-outs and openings;
.24 welding and welding-in procedure of thick-walled and forged items (brackets, stems, stern-tubes, thrusters' pipes).

For the reinforced-concrete hull, the following drawings are submitted additionally:
.25 section connections;
.26 reinforcement of monolithic areas of sections;
.27 reinforcement of ship hull in areas of cut-outs, installation sites of ship machineries, devices and hull fittings;
.28 installation drawings of embedments.

6.2 For the steering gear and thruster, the following documentation (drawings) shall be submitted to the Branch office for approval:
.1 general arrangement plan of steering gear;
.2 rudder, rudder stock, quadrant, main and reserve rudder drives, steerable nozzle, damper on waterjet-propelled ships, installation of rudder, nozzle, rudder shaft tube, mainpiece, rudder stock bearings, tiller, rudder angle limiters and nozzles;
.3 general arrangement plan of thruster.

6.3 For the anchor arrangement, the following documentation (drawings) shall be submitted to the Branch office for approval:
.1 general arrangement plan of anchoring arrangement;
.2 senhouse slip fastening;
.3 anchor hawses;
.4 remote-controlled anchor release device.

6.4 For the life-saving appliances, the following documentation (drawings) shall be submitted to the Branch office for approval:
.1 general arrangement plan of boat appliance;
.2 davits, their fastenings and tackles;
.3 lifeboats and their securing in the stowing for voyage;
.4 life-saving buoyancy aids (liferafts, benches, etc.) and their arrangement plans.

6.5 For the mooring and towing arrangements, the following documentation (drawings) shall be submitted to the Branch office for approval:
.1 general arrangement plan of mooring and towing arrangements, towing hook, arches, towing rope frame limiters, bitts, hawses;
.2 remote and local towing rope release device.

6.6 For the coupling arrangement, the following documentation (drawings) shall be submitted to the Branch office for approval:
.1 general arrangement plan of coupling arrangement;
.2 installation of coupling arrangement;
.3 installation drawings of release drives.

6.7 For the hydrofoil system, the following documentation shall be submitted to the Branch office for approval:
.1 drawings of bearing planes, stays, brackets, stabilizers, flaps;
.2 assembly drawings;
.3 installation diagram of hydrofoil system.

6.8 For the bending arrangements, the following documentation (drawings) shall be submitted to the Branch office for approval:
.1 general arrangement plan of bending arrangement;
.2 hydraulic cylinders, rotating frame, pump station, thrust metal structures;
.3 design of arrangement components connecting to ship hull (foundations, hull reinforcement).

6.9 For the cargo hatch covers, the following documentation shall be submitted to the Branch office for approval:
.1 general arrangement plan of hatchway cover;
.2 design drawings of hatchway cover;
For the cargo handing gears, the following documentation shall be submitted to the Branch office for approval:

1. General view drawing of cargo handing gear;
2. Drawing of control cabin with equipment;
3. Drawings of assemblies and components: of metal structures (derrick, gauge head, foundation of thrust-rotating arrangement, stay of fixed units, levers and tie rods of counterbalances, guy ropes of gauge head, etc.), gear assemblies (lifting, locking, turning, change in radius and transfer), lifting capacity limiter assembly, radius indicator, hook assembly, attachments of guy and cargo ropes, attachments of slip ring unit, installation of limit switches, units, hooks, fencings;

For the systems, the following documentation shall be submitted to the Branch office for approval:

1. Installation drawings (indicating the operating pressure and hydraulic test pressure) of cooling, lubrication, fuel supply, air supply, vent, steam pipeline, feed and condensate systems of the power plant;
2. Drawings of equipment of the system units and ship machineries being a part of the systems (at aggregate design method, except for panels);
3. Installation drawings (indicating the operating pressure and hydraulic test pressure) of ship’s ventilation, fire-fighting, drainage, ballast, bilge oily water discharge, cargo heating systems; hydraulic pneumatic actuators of ship auxiliary equipment and deck machinery; liquefied gas domestic facility; air, overflow and measuring pipelines, compressed air systems;
4. Installation drawings of refrigeration machine, refrigerant, air cooling and cooling water systems of the ships fitted with refrigerating plant;
5. Installation drawings of cargo handling, stripping, vent systems of the tankers;
6. Calculation of steam piping (if available) for thermal expansion including summary table of stresses and safety factors for all the piping sections;
7. Assembly drawing of collecting tanks indicating their capacity;
8. Assembly drawings of discharge connections with the indication of materials used and hydraulic test pressure.

For the shafting and propellers, the following documentation (drawings) shall be submitted to the Branch office for approval:

1. Shafting with stern-tube and propeller;
2. Thrust, intermediate and propeller shafts of the shafting;
3. Thrust and main bearings;
4. Couplings with bolts;
5. Stern-tube;
6. Propeller shaft lining;
7. Propeller;
8. Input (primary) and output shafts, gearing, propeller of steerable thruster.

For the power plant, the following documentation shall be submitted to the Branch office for approval:

1. Assembly drawings for installation of the main and auxiliary engines, steam and water boilers on the foundations;
2. Drawings of silencers and spark arresters.

For automation, the following documentation shall be submitted to the Branch office for approval:

1. Schematic diagrams and assembly drawings of remote control systems (with engines, thrusters, pitch changing mechanism, etc.);
2. Assembly drawings of control stations and consoles.

For the electrical equipment, the following documentation shall be submitted to the Branch office for approval:

1. Electric schematic diagrams of joints and connections, as well as assembly drawings of the main and emergency switchboards, control consoles, section power and light switchboards, monitoring, control and alarm switchboards and panels;
.2 circuit diagrams of electric drives for ship equipment stated in 5.3.1, 7.5 to 7.10 and 4.2 Table 4.5.1 Part VI RCCS;
.3 circuit diagrams of electric machines, propulsion plant, ship power plant generators, power mains; lighting, communication and alarm, monitoring, protection, locking and navigation light mains;
.4 drawings of cable routes throughout all ship rooms and spaces via watertight bulkheads, decks and platforms;
.5 arrangement and installation drawings of electrical equipment in all ship rooms and spaces with fastenings and earthing units;
.6 earthing drawings for ships with non-conductive hulls.

6.16 For the communication and navigation equipment, the following documentation shall be submitted to the Branch office for approval:
.1 arrangement and fastening drawings of antennas, design of antenna leads and their guards;
.2 arrangement and installation drawings of equipment in all ship rooms and spaces with fastenings and earthing units;
.3 drawings of routing and fastening cable routes throughout all ship rooms and spaces with fastenings;
.4 diagrams and drawings of devices for protection of radio signal reception against interference;
.5 drawings of echosounder trunks, arrangement and fastening of echosounder vibrators and cable routing;
.6 installation drawing of the main / steering (reserve) marine compass.

6.17 In addition to the documents specified in 6.1 to 6.16, the following documentation shall be submitted to the Branch office for approval:
.1 specification for ship’s and hull parts, arrangements, engines, shafting, boilers, power plant and ship systems, electrical and radio equipment;
.2 program (for serial ships) and acceptance trials procedure;
.3 general view and arrangement of ship rooms;
.4 fire control (general arrangement) plans indicating the following: arrangement of control stations; arrangement of fire-retarding and fire-resistant structures; arrangement of rooms protected by the fixed fire-extinguishing systems, indicating the location of devices and fittings to monitor their operation; arrangement of fire-fighting and emergency appliances; means of access to different compartments, rooms, on decks indicating the escape routes, corridors and doors; arrangement of fire hydrants; diagram of ventilation system including the central fan control system with indication of its location, and fans;
.5 installation diagram of navigation lights;
.6 list of outfit regulated by the Rules;
.7 docking plan;
.8 assembly and welding procedures of ship structures and hull (developed by the Constructor and approved by the Branch office which carries out technical supervision during construction);
.9 program and procedure of comparative and simulation ship trials;
.10 summary of the River Register remarks elimination on technical design (without stamping);
.11 list of operating design materials approved by the Branch office.
PERMISSION MAP FOR DEVIATION
FROM TECHNICAL DESIGN, DETAILED DOCUMENTATION,
technical documentation for materials or items,
PROCESS PROCEDURE

<table>
<thead>
<tr>
<th>Order No.</th>
<th>Drawing No.</th>
<th>Item's component description</th>
<th>Quantity</th>
<th>Shop№</th>
</tr>
</thead>
</table>

Deviation content
Deviation causes
Head of Shop (Department) ______________________ 20 ___

Conclusion

Head of Design Department
Chief Technologist (chief welder, chief metallurgist)
Chief Construction Manager of Ship

Agreed

Representative of QC Department
Representative of Designer
Representative of Customer
Surveyor of the River Register

Note: The deviation permit shall be agreed with the surveyor only for those structures documentation of which are agreed with the River Register.

Permitted

Chief Engineer ______________________
HULL TIGHTNESS TESTING

1 GENERAL PROVISIONS

1.1 Scope of application

1.1.1 This Appendix specifies the procedures and norms of tightness testing (capability of a structure not to pass water or other fluids) of metal hulls of the inland and river-sea navigation ships classified by the River Register.

1.1.2 The Appendix applies to the ships under construction and in service.

1.2 General requirements

1.2.1 The tightness testing which scope includes process exposure on the hull by test mediums with assessing the tightness of structures based on changes of test medium parameters or by detecting places of its penetration are carried out on all the hull structures, equipment, devices and hull fittings which may contact with water or other fluids under operating conditions and in emergency cases stipulated by the calculations and which shall not pass it keeping their serviceability.

1.2.2 In order to carry out the tightness testing, the compartments and hull structures are divided into 2 groups:

.1 group “a”: compartments and tanks which during operation are temporary or permanently filled with fluid as well as forepeak, afterpeak, hollow rudders, nozzles, hollow elements of foil arrangements, air boxes, watertight compartments of the motorboats without inner bottom;

.2 group “b”: compartments and structures of hull, superstructures and wheelhouses not included in group “a”., but according to the operating conditions shall be watertight including dry compartments of floating docks and thruster rooms which shall meet the tightness requirements.

1.2.3 The testing of hull, its compartments and separate structures shall be carried out according to the tightness testing diagram and table developed in accordance with this Appendix and agreed with the Branch office. The tightness testing diagram and table include the design documents defining the Nomenclature, arrangement, test methods and norms of compartments covered by the tightness requirements. When developing these documents provision shall be made to ensure the strength of hull structures and slipway sites according to the conditions of hull flooding testing.

When testing ship hull in floating dock the dock stability is assessed additionally.

1.2.4 All hull members including the inside parts which provide floating of a ship after launching from a slipway as well as structures inaccessible for inspection and defect elimination afloat, shall be tested on the slipway or in dock before ship launching.

Watertight hull structures accessible for inspection over the entire contour when ship is afloat (except for double bottom plating and watertight structures inside the double-bottom space) may be tested afloat, if they were not tested on slipway or in dock.

1.2.5 When performing assembly and welding operations providing the watertight of the hull structures, fittings and equipment
previously subjected to tightness testing, the local and global strength are checked.

Testing conditions and rejection parameters are agreed with the surveyor.

1.2.6 Before tightness testing the quality of welded and riveted joints are checked in accordance with 8 Part X RCCS — for welded joints, OST 5.9367 — for riveted joints of steel structures, OST 5.1031 — for riveted joints made of aluminum alloys.

1.2.7 The surface of tested structures and joints shall be cleaned, and the control surface of the structures shall be dry.

1.2.8 The structures and joints to be subjected to tightness testing shall not be painted, paved and covered with special coatings until completion of testing, except for cases specified in 1.2.9.

1.2.9 Before tightness testing the structures including intersectional connections may be fully primed and painted at the manufacture site meeting the following conditions:

1. main plates making part of the tight contour shall be at least 12 mm thick, and framing webs restricting the tested contour and welding to the main plates — at least 8 mm thick;

2. before painting (pavement or applying the special coatings) all the intersectional connections of structures making part of the tight contour are carefully inspected;

3. before priming and painting butt and tee joints related to the structures of group “a” and located below the waterline are subjected to tightness testing by wetting with petrol or blowing with compressed air;

4. double-sided welds of tee joints without continuous fusion are subjected to tightness testing by wetting with petrol or blowing with compressed air after the final formation of weld from one side or by applying an air pressure to the closed contour after the welding from both sides;

5. all operations on the structures related to installation, assembly, welding, leveling, riveting of the hull structures and fittings as well as installation, assembly, welding and riveting of all the saturating parts shall be completed. At the same time, all assembly-welding operations on the structures creating the tested contour from the side of adjacent hull structures shall be completed.

1.2.10 The structures tested and adopted on section of preliminary assembly may be primed and painted, except for section of 30 to 40 mm wide adjacent to the mounting edges. The specified sections may be primed only in case of applying the prime not affecting the welding quality.

1.2.11 The tightness testing of field joints made on slipway is carried out by wetting with petrol or blowing with compressed air before its priming.

1.2.12 The structures not subjected to tightness testing after their assembly which are designed to be located outdoor during the extended period of time may be primed with one layer, except for the intersectional welded connections and sections of 30 to 40 mm wide from each weld side.

1.2.13 If the shipyard provides stable manufacture quality of the hull structures, upon agreement with the Branch office the flooding testing of ships in a series may be replaced by air pressure testing which conditions are specified in note 1, Table A10.4.1. Prior to make a decision to carry out tightness testing of the structures by applying an air pressure, verification calculation of the tested structure strength shall be made.

If the design strength is insufficient to perceive the excessive pressure equal to 30 kPa, the air pressure may be reduced to 20 kPa upon agreement with the Branch office.

Other test methods may be used observing the requirements given in 3.7 of this Appendix.

2 TEST CATEGORIES

2.1 General

2.1.1 The test categories are determined by the scope and methods of tightness testing of the hull structures as well as hull fittings,
equipment and devices depending on the structure purpose and process sequence of its formation. The testing is divided into 3 categories: preliminary, main and verification.

2.1.2 Local tightness testing includes the tightness testing of an eliminating point of penetration defect.

2.1.3 General tightness testing includes the tightness testing of the entire structure using the methods specified for items' group to which this structure refers.

2.2 Preliminary testing

2.2.1 The preliminary tightness testing of intersectional connections of the hull structures are carried out while manufacturing the hull sections and blocks in order to decrease the test scope on the slipway.

The scope and methods of the preliminary structure testing are determined by the shipyard in accordance with the adopted construction technique.

2.2.2 The preliminary testing of the structures which will further be assembled and welded (except for assembly and welding along the mounting edges) are taken as the main testing, if the methods and norms of this testing comply with the methods and norms of the main testing.

2.2.3 Technical supervision for the preliminary testing is carried out by the surveyor by way of performing a sampling inspection.

2.3 Main testing

2.3.1 The main tightness testing is carried out by flooding in accordance with the testing diagram and table (design documents determining the nomenclature, arrangement, methods and norms of testing the compartments and structures covered by the tightness requirements) agreed with the Branch office.

2.3.2 Before the main tightness testing the assembly and welding as well as straightening operations of the structures included in the watertight contour to be tested shall be completed.

2.3.3 Technical supervision for the main testing is carried out according to Table A10.4.1.

2.4 Verification testing

2.4.1 The verification tightness testing of the compartments and structures of group "a" designed to store liquids is carried out by applying an excessive air pressure of 20 kPa upon completion of installation workmanship from both sides of the tested structures in accordance with testing diagram and table agreed with the Branch office.

2.4.2 The verification testing of tankers' tanks and cargo holds by flooding under pressure is carried out while checking the standard pumps and systems during the mooring and running trials.

2.4.3 Technical supervision for the verification testing is carried out by sample inspections. The verification testing is carried out witnessed by the surveyor.

3 TEST METHODS

3.1 Flooding testing

3.1.1 Hydrostatic pressure (head) during the flooding tightness testing is specified in accordance with the requirements given in Section 4 of this Appendix and determined in the testing diagrams and tables (see 1.3.3).

3.1.2 When checking the compartments and structures for which the testing head exceeds the structure height, in order to create the required head in the tested structure the head funneled pipe or rubber hose of at least 25 mm in diameter is installed. The standard air and measuring pipes may be used.

The pressure corresponding to the specified hydrostatic pressure may be created by means of low-duty booster pumps with diameter of delivery branch of less than 1.25 diameter of the head pipe.

3.1.3 When testing the structures using the head pipe, air-cushions in the upper parts of the tested structures are not allowed. To meet this condition openings of 8 to 10 mm in di-
ameter for air discharge are provided. Upon completion of the testing these openings are welded up and subjected to tightness testing by wetting with petrol or blowing with compressed air.

3.1.4 For testing the process fresh water without pollutants is used. Sea water may be used for testing of all the structures except for fresh water tanks, if the following conditions are met:

1. sea water shall not contain oil contaminates and other pollutants;
2. upon completion of testing and discharge of water the structure surfaces shall be washed with fresh water;
3. time of sea water in the structures shall not exceed two days from the moment of flooding.

3.1.5 The tested structures are inspected 1 hour after the test pressure is established.

3.1.6 Upon completion of testing the water from structures is removed. If pumping arrangements or standard openings are not provided, the water may be removed via the preliminary drilled and temporary plugged openings. Quantity, dimensions, locations of the openings are determined by the technical documentation approved by the surveyor. After discharging the water these openings are welded up and subjected to tightness testing witnessed by the surveyor.

3.1.7 In the event of environmental temperature below 0 °C the testing is carried out using the pre-heated water in the pre-heated structure. The water temperature is selected so that during testing the external surfaces of the tested structure have positive temperature, are not moisten and provide ingress of water through the leakinesses without freezing.

3.1.8 The structures are considered watertight if the tested surface is free from leaks in a form of jet, runs, drops and moisture.

3.2 Testing by water jet under pressure

3.2.1 The tightness testing by water jet under pressure is carried out using an applicator with a nozzle of at least 12 mm in diameter.

3.2.2 The water pressure in the hose shall provide the water jet of at least 10 m high.

3.2.3 The water jet is directed perpendicularly to the tested surface or into the connection when testing the closings. A distance from the nozzle to the tested section shall not exceed 1.5 m, and applicator travel speed along the tested connection shall not exceed 0.2 m/s.

3.2.4 Welded joints may be watered from any side, and riveted joints — only from the side opposite to caulking. If the welded and riveted joints are located vertically, they are watered from bottom to top.

3.2.5 Testing by water jet under pressure is carried out when the ambient temperature is above 0°C. When the temperature is below 0°C, the testing may be carried out using the water heated to the temperature of plus 40 to 70°C. The tested structure sections are pre-heated to the temperature above 0°C.

3.2.6 The structures are considered watertight if the tested surface is free from leaks in a form of jet, runs, drops and moisture.

3.2.7 Structures and arrangements for closing openings which are not subjected to tightness requirements of the Rules are tested by divergent water jet.

3.3 Air pressure testing

3.3.1 The testing is carried out by applying the excessive air pressure of 30 kPa.

3.3.2 The tested structure shall be provided with two pressure gauges with a scale factor not more than 2 kPa as well as with a safety valve. The liquid differential pressure gauges may be used. The connections for pressure gauges, safety valves and air hoses are arranged on the opening covers, temporary plugs or in other places accessible for maintenance.

3.3.3 In order to stabilize the air pressure before testing, the time when the structure is
Appendix 10

under pressure starts 15 min after the end of supplying air to the compartment.

3.3.4 During air pressure testing of welded joints and other connections using a brush or compressed air the polymeric foaming agents are applied in order to detect the air leakage points based on occurrence of firm bubbles and foam envelopes as well as change of colour. If the polymeric foaming agents are not available, small structures may be tested using foaming agents in the form of soap emulsions.

3.3.5 Welded joints and structures tested at ambient temperatures below 0°C are dried by heating up to complete removal of water before wetting with an antifreezing foaming agent.

3.3.6 The defective points are marked on the structure with a chalk.

3.3.7 Leakinesses of overlap welds are detected using the polymeric foaming agents by supplying the compressed air under the excessive pressure of 50 kPa into the gap between contacting places via a nozzle screwed into the opening of lining or welded reinforcing pad.

3.3.8 The structure is considered watertight, if when wetting the joints and other connections with foaming agent the air bubbles or foam envelopes do not occur, and the pressure drop after conditioning for 1.0 hour does not exceed 5%, and for the structures intended for storage of diesel fuel and/or other light oil products — 1 %.

3.3.9 Upon completion of testing the polymeric foaming agents are removed from the structure surface using water or a wet cloth.

3.4 Testing by wetting with kerosene

3.4.1 The tightness testing by wetting with kerosene is carried out in order to monitor the welded joints (except for overlap welds).

3.4.2 When testing by wetting with kerosene, the monitored side of the welded joint is covered with a chalk solution. The welds are wetted with kerosene from the opposite side when the chalk solution is dried. The kerosene is applied by a paint brush or a pad.

If the chalk solution is water-based, after the applying on the welded joints it is dried. Upon completion of testing, the chalk covering is removed by a cloth.

3.4.3 At ambient temperature below 0 °C the monitored welded joints are heated up to positive temperature and dried.

The chalk solution is antifreeze-based and keeps the white colour.

3.4.4 The hold time when testing butt and single-sided angle or tee joints with kerosene is determined depending on the thickness of joint's plate or leg and its space position according to Table A10.3.4.4.

<table>
<thead>
<tr>
<th>Thickness of joint's plate or leg (mm)</th>
<th>Hold time (min.) at joint's position</th>
</tr>
</thead>
<tbody>
<tr>
<td>low</td>
<td>vertical and horizontal</td>
</tr>
<tr>
<td>&lt;6</td>
<td>40</td>
</tr>
<tr>
<td>6-24</td>
<td>60</td>
</tr>
<tr>
<td>&gt;24</td>
<td>90</td>
</tr>
</tbody>
</table>

When testing the angle and tee joints with double sided welds as well as at negative ambient temperature, the hold time is doubled.

3.4.5 The structure is considered watertight, if on the monitored surface covered with chalk solution the kerosene marks do not occur.

3.5 Testing by blowing with compressed air jet

3.5.1 The testing by blowing with compressed air jet is used as an auxiliary method for local testing: testing of welding points of separate elements and parts, eliminating defective welded joints as well as doors, coamings and other elements located inside the hull and superstructures.

3.5.2 When testing by blowing with compressed air jet, the hose pressure shall be 390 to 490 kPa.

The jet is directed perpendicularly to the tested surface. The hose end is fitted with a nipple of 10 to 20 mm in diameter and is lo-
cated at a distance of not more than 100 mm from the tested joint's surface. The travel speed of the hose nozzle shall be not more than 0.02 m/s. The foaming agents (see 3.3.4 of this Appendix) are applied from a side opposite to blowing proactively (if the polymeric foaming agents are used) or synchronously (if the soap solutions are used).

3.5.3 The structure tightness assessment shall be performed in accordance with 3.3.8 of this Appendix.

3.6 Testing by divergent water jet

3.6.1 The tightness testing by divergent water jet is used to check the tightness of decks, platforms, doors and hatch covers. The divergent water jet is a descending jet branch released from the applicator upwards by the angle to the horizon.

3.6.2 When testing by divergent water jet, the requirements specified in 3.2.4 to 3.2.6 of this Appendix shall be met.

3.7 Testing by other methods

3.7.1 The methods of hull tightness testing other than those specified in 3.1 to 3.6 (e.g. luminescent method, air pressure using the leak seekers, vacuum method) may be used after experimental tests under supervision of the River Register. When selecting the test method, its application shall be specified: main and/or replacing, hull structures, types of connections and main parameters of welded joints, thicknesses of welded parts as well as methods of applied welding.

3.7.2 The procedure specification for method other than those specified in 3.1 to 3.5 shall be agreed with the Branch office.

4 METHODS AND NORMS OF TIGHTNESS TESTING

4.1 The tightness test methods and norms are given in Table A10.4.1.

<table>
<thead>
<tr>
<th>Compartments and structures</th>
<th>Methods and norms for ship classes</th>
<th>Additional guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M-СН, М-ПР, М, О-ПР</td>
<td>О, Р, Л</td>
</tr>
<tr>
<td>Compartment and structures of group &quot;а&quot;</td>
<td>By flooding to a height of 0.3 m above the bulkhead deck or up to level of the upper edge of the hatch coaming (by smaller pressure)</td>
<td>By flooding to the load waterline level, above this level — testing by water jet under pressure or wetting with kerosene</td>
</tr>
<tr>
<td>Double-bottom compartments</td>
<td>By flooding up to a height of 0.6 m above the inner bottom plating or to the top of air pipe (whichever provide the greater pressure)</td>
<td>By flooding up to a height of 0.35 m above the inner bottom plating or to the top of air pipe (whichever provide the greater pressure)</td>
</tr>
<tr>
<td>Double-side compartments</td>
<td>By flooding up to the top of air pipe</td>
<td>By flooding up to the top of air pipe</td>
</tr>
<tr>
<td>Tanks and compartments outside the double bottom</td>
<td>By flooding up to the top of air pipe, but not below the load waterline</td>
<td>By flooding up to the top of air pipe, but not below the load waterline</td>
</tr>
<tr>
<td>Storage tanks for liquid oil products of ship store and oily-water</td>
<td>By flooding up to the top of air pipe, but not below the</td>
<td>By flooding up to the top of air pipe, but not below the bulkhead deck</td>
</tr>
</tbody>
</table>
## Appendix 10

### Continuation of Table A10.4.1

<table>
<thead>
<tr>
<th>Compartments and structures</th>
<th>Methods and norms for ship classes</th>
<th>Additional guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Collecting tanks outside the double bottom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cargo compartments of tankers and cargo holds of other ships which may receive liquid cargo or ballast</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>§1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to the top of expansion trunk¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to the top of air pipe¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to the top of air pipe¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>See Note 1</td>
<td></td>
</tr>
<tr>
<td>Cofferdams</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to the top of expansion trunk¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to the top of air pipe¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to the top of air pipe¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When testing the ice boxes (when heating them with vapour), the testing water pressure in all the cases shall not be less than the design pressure in the heating system. For the ships with hull depth less than 5 m, the flooding height is taken equal to 0.5 of the hull depth, but not less than 1.5 m. The verification testing is omitted.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For the ships of O class the water column in pipes shall be at least 1 m above the upper point of the tank</td>
<td></td>
</tr>
<tr>
<td>Sea chests and ice boxes, sea water boxes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to the level of 1.25 of the hull depth, but not less than pressure in the blowing system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to the level of 1.25 of the hull depth, but not less than pressure in the blowing system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Independent water, fuel and lubricating oil tanks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to the top of air or overflow pipe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For the fuel and lubricating oil tanks the water column in pipes shall be at least 1 m above the upper point of the tank¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to the top of air or overflow pipe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For the fuel and lubricating oil tanks the water column in pipes shall be at least 1 m above the upper point of the tank¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When testing the ice boxes (when heating them with vapour), the testing water pressure in all the cases shall not be less than the design pressure in the heating system. For the ships with hull depth less than 5 m, the flooding height is taken equal to 0.5 of the hull depth, but not less than 1.5 m. The verification testing is omitted.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For the ships of O class the water column in pipes shall be at least 1 m above the upper point of the tank</td>
<td></td>
</tr>
<tr>
<td>Black water tanks and sewage water collecting tanks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding with pressure equal to 1.5 water column pressure from the tank bottom to the lower toilet bowl¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding with pressure equal to 1.5 water column pressure from the tank bottom to the lower toilet bowl¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Chain lockers of tankers and swimming pools</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to the upper edge of the chain locker (pool)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to the upper edge of the chain locker (pool)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Hollow rudders, cavities of fixed and steerable nozzles, hollow elements of foil arrangements</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding¹ with pressure ( p ), kPa, determined by the formula: ( p = 12.5T + \frac{v^2}{60} ), where ( T ) — draught of a full loaded ship, m;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>By flooding up to a height of 1 m above the upper edge of rudder (nozzle)¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For the ships of O class, the head shall be not less than for rudders (nozzles) of the ships of O-Π class¹</td>
<td></td>
</tr>
</tbody>
</table>
### Compartments and structures of group “b”

<table>
<thead>
<tr>
<th>Compartments and structures</th>
<th>Methods and norms for ship classes</th>
<th>Additional guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double side compartments not intended for storage of liquids</td>
<td>For ships with double bottom — testing by water jet under pressure above the double bottom level. For ships with single bottom — by flooding up to a height of 0.35 m from the outer bottom plating and testing by water jet under pressure above this level. The bulkheads of serial ships may be tested by wetting with kerosene, the outer shell — by swamping the ship to the draught which is less than draught of a light ship by 0.05 m. The compartments as a whole may be tested by applying air pressure using the polymeric foaming agents.</td>
<td>See Note 2</td>
</tr>
<tr>
<td>Vertical cofferdams</td>
<td>By flooding up to the top of air pipe or to the height of hatch coaming (by greater pressure)¹</td>
<td>—</td>
</tr>
<tr>
<td>Cargo holds of dry cargo ships, machinery, boiler and engine rooms</td>
<td>For ships with double bottom — testing by water jet under pressure above the double bottom level. For ships with single bottom — by flooding up to a height of 0.35 m from the outer bottom shell and testing by water jet under pressure above this level. The underwater part of the outer hull shell may be tested by swamping the ship to the draught which is less than draught of a light ship by 0.05 m.</td>
<td>—</td>
</tr>
<tr>
<td>Compartments in tween-deck space Double-bottom compartments</td>
<td>Hose test by water jet under pressure By flooding up to a height of 0.6 m above the double bottom</td>
<td>ditto</td>
</tr>
</tbody>
</table>

¹ For ships with double bottom — testing by water jet under pressure above the double bottom level. For ships with single bottom — by flooding up to a height of 0.35 m from the outer bottom plating and testing by water jet under pressure above this level. The bulkheads of serial ships may be tested by wetting with kerosene, the outer shell — by swamping the ship to the draught which is less than draught of a light ship by 0.05 m. The compartments as a whole may be tested by applying air pressure using the polymeric foaming agents.

² For ships with double bottom — testing by water jet under pressure above the double bottom level. For ships with single bottom — by flooding up to a height of 0.35 m from the outer bottom shell and testing by water jet under pressure above this level. The underwater part of the outer hull shell may be tested by swamping the ship to the draught which is less than draught of a light ship by 0.05 m.

---

**Note:**
- **v** — ship’s speed, knots. The water head shall be at least 50 kPa.
<table>
<thead>
<tr>
<th>Compartment and structures</th>
<th>Methods for ship class</th>
<th>Additional guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plating</td>
<td>M-СПЛ, М-ППР, М. О-ППР</td>
<td>О, Р, Л</td>
</tr>
<tr>
<td>Trunks of log and echo sounder, air boxes, buoyancy compartments</td>
<td>By flooding up to the level of bulkhead deck</td>
<td>—</td>
</tr>
<tr>
<td>Thruster rooms</td>
<td>Hose test by water jet under pressure</td>
<td>—</td>
</tr>
<tr>
<td>Propeller shaft tunnel including enclosures and trunks of emergency exit; tight trunks</td>
<td>Hose test by water jet under pressure</td>
<td>See Note 2</td>
</tr>
<tr>
<td>including trunks of the engine and boiler rooms; ventilation ducts situated inside the</td>
<td>ditto</td>
<td></td>
</tr>
<tr>
<td>hull, superstructures and wheelhouses</td>
<td>ditto</td>
<td></td>
</tr>
<tr>
<td>Chain lockers</td>
<td>ditto</td>
<td></td>
</tr>
<tr>
<td>Anchor hawse and chain pipes</td>
<td>ditto</td>
<td></td>
</tr>
<tr>
<td>Superstructures and wheelhouses including open parts of engine and boiler room trunks</td>
<td>ditto</td>
<td></td>
</tr>
<tr>
<td>and funnel casings</td>
<td>ditto</td>
<td></td>
</tr>
<tr>
<td>Open deck parts of a ship hull, superstructures and wheelhouses outside areas tested by</td>
<td>Hose test by water jet under pressure</td>
<td>—</td>
</tr>
<tr>
<td>flooding with excessive pressure or applying air pressure</td>
<td>Coamings are tested by water jet or by wetting with kerosene</td>
<td></td>
</tr>
<tr>
<td>Coamings of hatches and ventilation pipes situated on the open parts of the upper deck,</td>
<td>Coamings are tested by water jet or by wetting with kerosene</td>
<td>—</td>
</tr>
<tr>
<td>superstructure and wheelhouse deck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decks and enclosures in the rooms where water may accumulate (showers, bathrooms,</td>
<td>By flooding up to the height of doors’ coaming, above this level — testing by divergent</td>
<td>—</td>
</tr>
<tr>
<td>washrooms, laundries, galleys, toilette scuppers, etc.)</td>
<td>water jet</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The flooding testing may be replaced by the testing by wetting with kerosene.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>In winter season the whole area of decks may be tested by wetting with kerosene.</td>
<td></td>
</tr>
</tbody>
</table>

**Closures for openings in tight hull parts**

1. Doors in watertight

<table>
<thead>
<tr>
<th>Methods for ship class</th>
<th>Additional guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>O, Р, Л</td>
<td>—</td>
</tr>
<tr>
<td>Compartments and structures</td>
<td>Methods and norms for ship classes</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>hull bulkheads</td>
<td>level set for the corresponding compartment</td>
</tr>
<tr>
<td></td>
<td>for the corresponding compartment</td>
</tr>
<tr>
<td>2. Doors in the external walls of superstructures and wheelhouses</td>
<td>Hose test by water jet under pressure</td>
</tr>
<tr>
<td></td>
<td>Testing by water jet under pressure or blowing with compressed air jet</td>
</tr>
<tr>
<td>4. Shell doors</td>
<td>Hose test by water jet under pressure</td>
</tr>
<tr>
<td></td>
<td>ditto</td>
</tr>
<tr>
<td>5. Covers of skylights and hatchways, side scuttles of hull superstructures and wheelhouses</td>
<td>ditto</td>
</tr>
<tr>
<td>6. Covers of openings in the tight decks, platforms and bulkheads</td>
<td>ditto</td>
</tr>
<tr>
<td>7. Metal closures for cargo holds of dry cargo ships</td>
<td>Testing of cargo compartments during the main testing</td>
</tr>
<tr>
<td>8. Metal closures for cargo holds of tankers transporting liquid cargoes (including oil products) in holds</td>
<td>Testing of cargo compartments during the main testing</td>
</tr>
</tbody>
</table>

Notes: 1. If the flooding testing on the slipway or in dock is impracticable, it is carried out after launching. Before launching all the cargo compartments are tested by applying air pressure. One central and two side compartments determined upon agreement with the surveyor are tested by flooding. These compartments are tested simultaneously. The mutual position of the tested compartments shall correspond to the most severe load conditions. If during testing the structure defects or tightness breaks are detected, the all compartments shall be tested.

2. The testing by water jet under pressure may be replaced by testing the welded joint by wetting with kerosene (except for overlap welds) or by blowing with compressed air jet. The plate surfaces are carefully inspected. No defects and metal integrity loss are permitted.

3. Methods and norms of the tightness testing during repair and special surveys of ships shall comply with the requirements specified in this Table. Fuel and water tanks are tested by flooding up to the top of air pipe, and cargo compartments and cofferdams of tankers — up to the upper edge of the expansion trunks and hatches. The scope of testing during repair is specified depending on the nature of repair and shall be agreed with the surveyor.
PERMISSIBLE WELDING DEFORMATIONS OF SHELL AND HULL FRAMING AND DEVIATIONS DURING SHIP'S HULL ASSEMBLY

1 Sag values of cambers, ribbing, dents and "boxes" (angular camber) of the hull structures' shell shall not exceed the values specified in Table A11.1. Sag values of cambers, "boxes" and ribbing of the bottom shell of 4 to 7 mm thick for high-speed craft within spacing shall not exceed 3 mm.

2 Local deformations of the hull framing structures (sags, skewness, wall cambers) shall not exceed the values specified in Table A11.2. Welding deformations of hull structures outside the limits specified in this Appendix shall be eliminated. The applied correction methods and technique shall comply with the manufacturing procedure of this structure.

3 The permissible deviations during hull assembly are given in Table A11.3.

<table>
<thead>
<tr>
<th>Structure's group</th>
<th>Hull structure description</th>
<th>Maximum permissible sag value (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA</td>
<td>Upper deck plating, double-bottom plating, bottom plating, side plating below the design waterline, upper and lower strakes of continuous longitudinal bulkheads and inner sides, deck plating and superstructures walls (in the middle part of the hull within 0.25 L forward of and abaft the midship), bilge strake of the outer shell and deck stringer (along the ship length)</td>
<td>5</td>
</tr>
<tr>
<td>IIb</td>
<td>Side plating above the design waterline, external walls of superstructures and wheelhouses, open decks, bulwark, enclosures of internal corridors, funnel casings and other structures to the appearance of which the strict requirements are applied</td>
<td>6</td>
</tr>
<tr>
<td>II</td>
<td>Structures of IA group situated in the hull extremities as well as main longitudinal and transverse bulkheads (except for the upper and lower strakes), lower deck platings, platform platings, internal enclosures and light bulkheads</td>
<td>7</td>
</tr>
<tr>
<td>III</td>
<td>Decks (cladded) not included in calculation of global strength and not referred to I and II groups; internal bulkheads and enclosures cladded from both sides; enclosures in store-rooms, holds, engine rooms, shower rooms and other structures to the appearance of which the special requirements are not applied</td>
<td>10</td>
</tr>
</tbody>
</table>
## Table A11.2

<table>
<thead>
<tr>
<th>Deformation description</th>
<th>Monitored framing description</th>
<th>Permissible sag or skewness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floors and keelsons of double bottom space</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rest web framing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entire framing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Bulge of flat parts of framing webs | Floors and keelsons of double bottom space | 5 |
| Stiffener’s drop | Rest web framing | 9 |
| “Box” in framing web plane | Entire framing | 2 |
| “Box” at framing intersections from framing web plane | Entire framing | 2 |
| Skewness between framing web and shell | Entire framing | 6 |
| Skewness between strake and framing web at h (mm) | Entire framing | 3 |

### Note:

$h$ — framing web height.

## Table A11.3

<table>
<thead>
<tr>
<th>Parameter to be checked</th>
<th>Tolerance permitted</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement of edges of jointing shell and plating plates</td>
<td>0.1 of plate thickness</td>
<td>Max. 3 mm</td>
</tr>
<tr>
<td>Deviation from straightness of jointing branches within the length of mounting spacing: vertical keel, stringers, carlings</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>longitudinal stiffeners</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Deviation from straightness of web frame branches jointed with floors and beams within total length up to 1 m</td>
<td>—</td>
<td>Max. 8 mm within the entire length</td>
</tr>
<tr>
<td>Misalignment of any hull members separated by a plate</td>
<td>0.5 of member web thickness</td>
<td>The minimum thickness is taken into account</td>
</tr>
<tr>
<td>Deviation of mounting spacing size</td>
<td>4 % of spacing size</td>
<td></td>
</tr>
<tr>
<td>Offset of bulkhead web relative to underlying framing web</td>
<td>0.5 of framing web thickness</td>
<td></td>
</tr>
<tr>
<td>Vertical deviation of bulkhead plane from station plane</td>
<td>2 mm for 1 m of bulkhead height</td>
<td>Max. 15 mm within the entire height</td>
</tr>
<tr>
<td>Offset of rudder stock axis relative to the centreline plane</td>
<td>&lt;3</td>
<td></td>
</tr>
<tr>
<td>Offset of opening centre in the sternframe from the main shaft axis</td>
<td>&lt;3</td>
<td></td>
</tr>
<tr>
<td>Offset of centre of rudder stock openings in the sternframe from vertical axis</td>
<td>&lt;5</td>
<td></td>
</tr>
<tr>
<td>Deviation of sternframe sole from the main plane</td>
<td>&lt;8</td>
<td></td>
</tr>
</tbody>
</table>
INSPECTION OF ENGINES FOR COMPLIANCE WITH MAXIMUM PERMISSIBLE HARMFUL SUBSTANCE EMISSION AND EXHAUST GASES OPACITY

1 Requirements to fuels and lubricants

1.1 While testing the engine shall operate on fuel and lubricants specified in technical documentation of the engine manufacturer. The specifications of fuel and lubricant used for testing shall be specified in the Test Report.

2 Atmospheric conditions during measurements

2.1 At the testing site, the following parameters shall be measured: atmospheric air temperature at the engine inlet $T_a$, K, atmospheric (barometric) air pressure $p_0$, kPa, considered as sum of partial pressures of dry air and water vapours in atmospheric air as well as relative and absolute air humidity used for calculation of partial pressure of dry atmospheric air.

2.2 Based on the measurement results the design coefficient (atmospheric factor) $F$ is calculated by the formulae:

For naturally aspirated engines, engines supercharged by a PTO supercharger or engines with combined supercharging:

$$ F = \left( \frac{99}{p_{\text{dry}}} \right)^{0.7} \left( \frac{T_a}{298} \right)^{1.5}; \quad (A12.2.2-1) $$

For engines supercharged by free turbocharger:

$$ F = \left( \frac{99}{p_{\text{av}}} \right)^{0.7} \left( \frac{T_a}{298} \right)^{1.5} \quad (A12.2.2-2) $$

where $p_{\text{dry}}$ — partial pressure of dry atmospheric air, kPa, calculated by the formula:

$$ p_{\text{dry}} = p_0 - p_{\text{H}_2\text{O}} \quad (A12.2.2-3) $$

2.3 The testing results are considered reliable if during testing $F$ remains within the limits set for engines during:

- onboard testing: $0.93–1.07$
- bench testing: $0.98–1.02$

3 Measurement of exhaust gas composition

3.1 The exhaust gas composition is measured for engine operation modes specified in Table A12.3.1 depending on its application. The measurement shall be started with nominal power mode and then the load shall be gradually decreased to the minimum.

3.2 Before measurement the gas analyzers are heated and calibrated in accordance with the manufacturer instruction.

3.3 The gas analyzer indications are read for each mode three times with an interval of not less than 1 minute. The first reading is made not earlier than 2 minutes after the establishing the temperature condition of the engine in the test mode. The results of three sequential readings shall not differ more than by $\pm 3.5 \%$. The measurement result is taken as arithmetic mean of three readings. If an event recorder is provided the measurement result is taken as arithmetic mean of continuous recording during 1 minute, if during the entire time of recording the deviations from initial value is not more than $\pm 3.5 \%$. 

$F$ — design coefficient (atmospheric factor) for the atmospheric conditions under which the measurement is performed.

$T_a$ — atmospheric air temperature at the engine inlet, K.

$T_r$ — temperature at the engine exhaust, K.

$F_r$ — design coefficient (atmospheric factor) for the atmospheric conditions at the engine exhaust.

$p_0$ — barometric air pressure at the testing site, kPa.

$p_{\text{H}_2\text{O}}$ — partial pressure of water vapours in atmospheric air at $T_a$, kPa.
### Engine operation modes during measurement of exhaust gas composition

<table>
<thead>
<tr>
<th>Engine application</th>
<th>Mode designation</th>
<th>Mode</th>
<th>Relation of crankshaft revolution frequency (n) to the crankshaft revolution frequency at the rated power (n_{\text{rat}})</th>
<th>Relation of engine output (P_e) to its rated value (P_{e\text{rat}})</th>
<th>Torque (%)</th>
<th>Mode weight coefficient (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main engines (except for hydrofoil diesel engines)</td>
<td>E3</td>
<td>1</td>
<td>1.000</td>
<td>1.00</td>
<td>—</td>
<td>0.20</td>
</tr>
<tr>
<td>operating as per propeller characteristic</td>
<td></td>
<td>2</td>
<td>0.908</td>
<td>0.75</td>
<td>—</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>0.794</td>
<td>0.50</td>
<td>—</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>0.630</td>
<td>0.25</td>
<td>—</td>
<td>0.15</td>
</tr>
<tr>
<td>Main engines for ships with a length less than 24 m</td>
<td>E5</td>
<td>1</td>
<td>100</td>
<td>100</td>
<td>—</td>
<td>0.08</td>
</tr>
<tr>
<td>(except for tugboats and pushboats) operating as per</td>
<td></td>
<td>2</td>
<td>91</td>
<td>75</td>
<td>—</td>
<td>0.13</td>
</tr>
<tr>
<td>propeller characteristic</td>
<td></td>
<td>3</td>
<td>80</td>
<td>50</td>
<td>—</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>63</td>
<td>25</td>
<td>—</td>
<td>0.32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>Idle run</td>
<td>0</td>
<td>—</td>
<td>0.30</td>
</tr>
<tr>
<td>Auxiliary engines with variable load and constant</td>
<td>D2</td>
<td>1</td>
<td>—</td>
<td>—</td>
<td>100</td>
<td>0.05</td>
</tr>
<tr>
<td>revolution frequency (diesel generators)</td>
<td></td>
<td>2</td>
<td>—</td>
<td>—</td>
<td>75</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>—</td>
<td>—</td>
<td>50</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>—</td>
<td>—</td>
<td>25</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>—</td>
<td>—</td>
<td>10</td>
<td>0.10</td>
</tr>
<tr>
<td>Main engines operating as per propeller characteristic</td>
<td></td>
<td>1</td>
<td>—</td>
<td>—</td>
<td>100</td>
<td>0.55</td>
</tr>
<tr>
<td>in mooring mode</td>
<td></td>
<td>2</td>
<td>—</td>
<td>—</td>
<td>83</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>—</td>
<td>—</td>
<td>63</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>—</td>
<td>—</td>
<td>39</td>
<td>0.15</td>
</tr>
</tbody>
</table>

3.4 Simultaneously with measuring the exhaust gas composition the values of engine parameters required for determining the regulated parameters are recorded.

3.5 Upon the engine testing results the Engine Test Report is drawn up in order to confirm the compliance of the engine to the technical regulations of harmful substances emissions and opacity in exhaust engine gases (TOCT P 52408).

4 Processing of measurement results

4.1 Hourly fuel mass flow is measured for each test mode by methods providing the accuracy of ±5%.

4.2 The exhaust gas flow \(V_{\text{exh}}\) is measured by any direct method followed by reducing to normal atmospheric conditions or is calculated according to the measured values of air and fuel flow for each test mode by the formula specified in 6.2.5 RPPS.

5 Measurement of exhaust gas opacity by optical method

5.1 The exhaust gas opacity is measured in the engine operation modes which are the same for measurement of exhaust gas composition.

The installation diagram of the optical-type smoke density indicator is given in Fig. A12.5.1.

5.2 Before measuring the smoke density indicator is heated and calibrated according to the reference light filter included in the device set in accordance with the manufacturer instruction.

5.3 The opacity parameters are measured for each engine operation mode at least three times with an interval between the following measurements of at least 1 minute. After each measurement the zero position of the smoke density indicator arrow is checked and set to the zero position, if required. The measure-
5.4 The measurement results are included in the Test Report.

6 Measurement of exhaust gas opacity by filtration method

6.1 The installation diagram of filtration-type smoke density indicator is given in Fig. A12.6.1.

Before measuring the smoke density indicator is heated and calibrated according to the reflectance standard included in the device set in accordance with the manufacturer instruction.

6.2 A sample is collected in accordance with operation instruction developed by the manufacturer of the smoke density indicator. The sample is passed through a filter which then is removed from the smoke density indicator and replaced with a new one through which a new sample is passed in order to recheck the result and receive its mean value. No moistened or non-standard filters are permitted.

Fig. A12.6.1. Installation diagram of filtration-type smoke density indicator:
1 — straight section of exhaust engine pipeline; 2 — gas sampling probe; 3 — sampling line; 4 — cooler; 5 — smoke density indicator; EG — exhaust gases
6.3 The opacity for each engine operation mode is measured at least three times with an interval between two following measurements of at least 1 minute. After each measurement the zero position of the smoke density indicator arrow is checked and set to the zero position, if required. The measurements are considered valid, if deviations between two last readings as per scale FSN do not exceed \( \pm 0.2 \) FSN, and the results of three measurements do not form a steadily decreasing or increasing sequence. If these conditions are met, the measurement series can be continued until receiving three sequence parameters meeting the specified conditions. The measurement result is taken as arithmetic mean of three readings.

6.4 The measurement results are included in the Test Report.
GUIDELINES FOR TESTING OF TYPE SPECIMENS OF LIFE-SAVING APPLIANCES

1 Lifeboats

1.1 Testing of type specimens of lifeboats includes:
.1 main dimensions checking;
.2 lifeboat weight determining;
.3 freeboard height determining;
.4 lifeboat strength testing;
.5 lifeboat tightness testing;
.6 lifeboat stability testing;
.7 accommodation capacity checking;
.8 lifeboat floodability testing;
.9 removable air boxes testing;
.10 floodability testing of lifeboat buoyant material;
.11 strength testing of lifeboat handling gear;
.12 strength testing of plugging and fastening the handling gear (for plastic lifeboats);
.13 checking of lifeboat engine operation;
.14 fire testing (for lifeboats of oil tankers).

1.2 The main dimensions are checked and lifeboat weight is determined as follows:

.1 in order to measure, a lifeboat is positioned horizontally on level in longitudinal and transverse directions.

During measurement the following parameters are determined: compliance of thwart height and distance between transverse thwarts, dimensions $L$, $B$, $H$ of lifeboat hull and distance $A$ to the design documentation. Here:

$L$ — distance between projections on the base plane of intersections of external shell surface and stem and sternframe (transom) at level of lower gunwale edge, m;

$B$ — maximum width between the external shell surfaces;

$H$ — side height in the middle of lifeboat from BL to the gunwale edge, m;

$A$ — distance between axial lines of lifting hooks, m;

.2 weight of lifeboat fully completed with ship equipment and outfit is determined by weighing. The weighing may be performed using dynamometers secured on the lifeboat hooks.

1.3 The freeboard height is measured amidstships on both sides of the lifeboat in light and fully loaded conditions on still water.

The outfit and persons weight may be replaced by equivalent load weight. Weight of one person is taken equal to 75 kg, and position of centre of gravity — at a height of 0.3 m above a thwart.

1.4 The lifeboat hull is subjected to strength testing taking into account the following guidelines:

.1 lifeboat is hanged by handling gear and loaded with a load distributed at seats for persons with weight determined by the formula, kg,

$$G_{\text{load}} = 0.25G_h + 1.25(G_p + G_o)$$

where $G_h$ — weight of lifeboat hull, kg;

$G_p$ — weight of people, kg;

$G_o$ — weight of outfit, kg.

At the same time the keel, keelsons, sheerstrake, bulwark are inspected. The lifeboat is deemed to have passed the testing, if it is free from cracks and other damages.
plastic lifeboat are additionally tested by impact and drop. The lifeboat with a load of weight equal to persons and outfit weight is hanged by lifeboat hooks on slings of 6 m long at a distance of 0.5 m from the lifeboat gunwale to the vertical surface (e.g. concrete walls).

The lifeboat is deflected from the vertical surface by 2.5 m and suddenly released. The lifeboat with the same loading condition is dropped from a height of 2.5 m from the lower keel edge to the water surface. Water depth in the test site shall not be less than two side heights of the lifeboat amidships. The lifeboat is deemed to have passed the testing, if it is free from residual deformations, cracks and other damages. The lifeboat not having passed the testing, after eliminating the defects, is allowed to undergo the strength testing again.

1.5 The lifeboat having passed the strength testing is subjected to tightness testing using one of the following methods:

on keel-blocks — by flooding the hull up to the level corresponding to the draught of the lifeboat fully completed with persons or ballast replacing them and outfit. The lifeboat is deemed to have passed the testing, if during 2 hours after flooding the external surface is free from leakages and drops;

afloat — at draught corresponding to displacement of the lifeboat fully completed with persons and outfit. The lifeboat floating for 2 hours on even keel and in upright position shall be free from leakages. However, for wooden lifeboats the flooding up to the level of 20 mm from the lower keelson edge is permitted.

The lifeboat not having passed the tightness testing, after eliminating the leakages, is tested again.

In order to test the above water part, the lifeboat on keel-blocks or afloat is alternatively sloped on right and left side so that water achieves the gunwale level. The hold time on each side is 30 minutes. The lifeboat is deemed to have passed the testing, if the monitored surface is free from leakages.

1.6 Stability testing procedure

1.1 The testing is carried out afloat with a load corresponding to the weight of permitted number of persons and outfit. The load is arranged on the places for persons and outfit. Centre of gravity of the load simulating persons is positioned at a height of 0.3 m from thwarts and secured to prevent the offset at heel. The lifeboat shall not have a heel.

1.2 In order to incline, the load with a weight of 4 to 5% of total water displacement is moved from side to side. When inclining the moment statically inclining the lifeboat by 10° from zero position is determined and compared with the specified in the design documentation.

1.3 The sufficiency of freeboard height is checked. It shall be at least 100 mm when the lifeboat is loaded with 50% of the number of persons permitted to accommodate seated to one side of the centreline.

1.7 Testing by accommodating persons is carried out on the site protected from current, waves and wind. The testing may be carried out at current of less than 0.1 km/h, ripple and wind up to 3 m/s (hereinafter referred to as the calm water).

Persons 75 kg each (in average) are taking seats in lifejackets. The number of persons shall correspond to the design capacity of the lifeboat. The testing results determine if the persons obstruct each other when paddling and if each person is capable to stand up and take the provided outfit.

1.8 During floodability testing the lifeboat with ballast simulating the persons, and outfit is flooded up to the upper gunwale edge. At the same time the freeboard height is measured (it shall be at least 20 mm) and the lifeboat is checked for a heel.

If the lifeboat has not passed the testing, the capacity of air boxes or floating material is increased or number of persons permitted to accommodate is reduced.

1.9 The tightness testing of removable air boxes is carried out using one of the following methods:
.1 An air box is weighted and fully submerged in water so that the water layer above its surface comprises at least 100 mm. After 2 hours the air box is recovered and weighted. If the box weight is not changed, it is deemed to have passed the testing;

.2 Air box is submerged into a tank containing hot water with a temperature of 60 to 70°C so that the water layer above its surface comprises at least 100 mm, and the box is turned over in the water for 10 to 15 minutes. If the box is untight, the heated air will expand and come out, and bubbles will show the defect point;

.3 Compressed air through a nipple soldered to one of the angles of the tested box is pressurized into the air box up to it reaches the excessive pressure of 0.0196 MPa. If pressure drop measured after 20 minutes does not exceed 1% of the specified (excessive) pressure, the box is deemed to have passed the test.

The box capacity is determined using one of the following methods:

- careful calculation performed according to the results of measuring the box dimensions
- filling the box with water the volume of which is measured in the calibrated vessel
- submerging the box into the tank fitted with fixed scale graduated in volume units.

Before testing the load required for holding the box in fully submerged condition is lowered. According to the water level in the tank with lowered load a zero mark is installed. The box with the load is submerged into the tank to a depth of 100 mm from water level. The water level is marked as per scale and volume of the air box is determined.

1.10 The buoyancy testing of lifeboat buoyant material is carried out on a specimen. Before submerging the specimen, the weight which specimen is capable to support is determined. Then the specimen is submerged in water so that the water layer above the surface is at least 100 mm, and it is conditioned for 24 hours. After that, the weight which the specimen is capable to support is determined again.

.1 The specimen is deemed to have passed the test, if the difference between load weights in the beginning and at the end of test does not exceed 10% of load weight in the beginning of test, and upon test completion the specimen is free from damages, shrinkage, blistering or other changes of mechanical properties.

1.11 Strength testing of lifeboat handling gear:

.1 Before installing on the lifeboat each lifeboat hook (or replacing device) as well as hangers and fastenings shall be tested with load of a weight equal to \( G_p \), kg, for 10 minutes

\[
G_p = 2\left(G_h + G_p + G_o \right)/n
\]

where \( G_h \) — weight of lifeboat hull, kg;
\( G_p \) — weight of people, kg;
\( G_o \) — weight of outfit, kg;
\( n \) — number of hooks.

During testing the release of lifeboat with onboard handling gear is checked after its launching both in light and design loaded condition.

The handling gear is deemed to have passed the test, if after unloading the components are free from cracks, tears and residual deformations. The absence of deformations is determined by measuring the distance between three points marked on the component surface with a centre punch.

.2 The gear as a whole is tested simultaneously with strength testing of the lifeboat.

1.12 When checking the strength of plugging and fastening the handling gear the plastic lifeboat overloaded by 50% and hanged by hooks is lowered with speed of 0.6 m/s and then hard braked. The structure is inspected for integrity, and the lifeboat hull is inspected for cracks and deformations.

1.13 Check of engined lifeboat operation

.1 Lifeboat afloat is loaded with load corresponding to the weight of permitted number of persons and outfit. The engine start is checked (including manual start). The start time shall be not more than 2 minutes.

The lifeboat maneuverability is checked for 2 hours and within this time the fuel consumption is determined;
...and the capability of engined lifeboat to tow a liferaft with the maximum capacity in loaded condition with speed of at least 3.7 km/h is checked;

.3 the lifeboat engine operation for at least 5 minutes when it is flooded up to the crankshaft axis is checked. As a result of this test the engine shall not be damaged.

1.14 The lifeboats of oil tankers are additionally tested by fire.

The water area with an extend exceeding the lifeboat dimensions in plan view is filled with kerosene which quantity when ignited is sufficient to cover the lifeboat with fire for 8 minutes. During the fire testing the temperature in several points inside the lifeboat is measured (it shall not exceed 60°C). At the same time, the space inside the lifeboat is checked for smoke and harmful gases in air by analyzing the collected samples.

After the fire testing, the lifeboat is subjected to tightness testing.

2 Liferafts

2.1 Testing of type specimens of liferafts includes:

.1 weighting;
.2 drop testing;
.3 jump testing;
.4 towing testing;
.5 afloat testing;
.6 accommodation capacity testing;
.7 stability testing;
.8 flooding testing;
.9 special testing of inflatable liferafts;
.10 testing of hydrostatic release device of liferaft.

2.2 The liferaft fully completed and packed in container or case is subjected to weighting.

2.3 During the drop testing the liferaft packed in case or container with outfit is dropped from a height of 10 m to water. A free end of painter is laid out simulating the real falling conditions. After dropping the liferaft is remained afloat for 20 minutes and checked for positive buoyancy. After lifting the liferaft is inspected. If the liferaft is inflatable, it is inflated up to the operating pressure in order to inspect it. The liferaft is deemed to have passed the test, if it and its outfit are free from damages which would result in degradation in performance.

2.4 When testing by jumping the testers with a weight of not less than 75 kg and wearing shoes with flat sole jump at least 5 times from a height of at least 4.5 m to the liferaft full operational and afloat. The jump testing may be replaced by dropping a load with equal weight onto the liferaft.

The liferaft is deemed to have passed the test, if it is free from breaks and damages.

2.5 During towing testing the liferaft full operational in fully loaded condition is towed by a towing rope secured on the liferaft's towing eye to a distance of at least 100 m at a speed of 5.5 km/h on calm water.

The liferaft is deemed to have passed the test, if it and towing arrangements are free from damages.

2.6 Afloat testing

.1 liferaft with a load corresponding to the weight of design number of persons and outfit is brought to an anchor in water area. The liferaft is remained afloat for 3 days. If the liferaft is inflatable, it may be additionally pumped by hand-bellows once a day.

The liferaft shall maintain its form and be free from damages;

.2 the afloat testing defines that the liferaft at design load is capable to move on calm water to a distance of at least 30 m by means of paddles included in the outfit.

2.7 Accommodation capacity testing

.1 design number of persons 75 kg each (in average) dressed in the lifejackets are accommodated on the liferaft.

The testing determines whether the liferaft has enough place for all the persons taking into account a space overhead under the canopy and whether the persons are capable to use the outfit inside the liferaft.

During testing the possibility of ease and quick (for 1 minute) closing/opening entries...
in canopy (from outside and inside) is checked.

If the canopy is removable two testers install the canopy for 5 minutes and check the possibility to open and close the entries;

.2 the liferaft with raised canopy is checked for possibility of water ingress into the under-canopy space when entries are closed. For this purpose, the entries are tested by divergent water jet directed perpendicularly to the entry surface for 5 minutes. As result, no significant water accumulation inside the liferaft shall be observed.

2.8 Stability testing

.1 The design number of persons are accommodated at one side of the operational liferaft situated on calm water. The testing determines whether the freeboard remains positive and whether there is a risk of downflooding the liferaft.

.2 In order to check the liferaft stability during boarding, two testers dressed in lifejackets climb onto the liferaft from water on their own. Then they raise from water the third person who simulating a loss of consciousness. The results show whether the liferaft is stable and whether there is a risk of its capsizing.

2.9 During flooding testing the operational liferaft situated on calm water and completed with outfit and design number of persons (or ballast simulating the design load) is completely flooded. It is determined whether the liferaft is afloat and whether there are significant hull deformations.

2.10 Special testing of inflatable liferaft design:

.1 the liferaft is inflated using the gas inflation system at ambient temperature from 18 to 20°C.

The liferaft is deemed to have passed the test, if the operating pressure is achieved for not more than one minute and the liferaft is free from joint deformation, cracking or any other damages;

.2 the liferaft packed and completed with outfit is conditioned for at least 24 hours in the cold chamber with a temperature of minus 30°C. After that, the liferaft is inflated using the gas inflation system.

The liferaft is deemed to have passed the test, if the operating pressure is achieved for not more than 3 minutes and the liferaft is free from joint deformation, cracking or any other damages;

.3 the liferaft packed and completed with outfit is conditioned for at least 8 hours in the chamber with a temperature of plus 50°C. After that, the liferaft is inflated using the gas inflation system.

The liferaft is deemed to have passed the test, if the operating pressure is achieved for not more than one minute and the liferaft is free from joint deformation, cracking or any other damages;

.4 the liferaft is tested by pressure. For this purpose, the inflatable compartment (buoyant chamber) of the liferaft is inflated with compressed air up to pressure two times higher than the operating pressure. The safety valves are in non-operation condition.

The liferaft is deemed to have passed the test, if within 10 min the pressure is not decreased more than by 5% and it is free from any damages;

.5 the liferaft is subjected to buoyancy testing. During buoyancy testing it is stated that the liferaft one buoyancy compartment of which is not inflated is capable to support the design number of persons 75 kg each (in average) sitting in normal position providing the positive freeboard along the entire perimeter.

2.11 Testing of hydrostatic release gear of liferaft:

.1 during temperature testing the hydrostatic release gears are placed into a chamber with a temperature of minus 30°C and conditioned for 8 hours. Then the gears are placed into a chamber with a temperature of plus 50°C for 8 hours. This procedure is repeated 10 times. At the end of testing one hydrostatic release gear shall be taken from the chamber with temperature of minus 30°C and activated in water with a temperature of 0°C. The other hydrostatic release gear shall be taken from
the chamber with temperature of plus 50°C and activated in water with a temperature of plus 30°C;

.2 when testing the hydrostatic release gear by submerging and manual releasing, the design hydrostatic load is applied to the gear when it is submerged or is in a tank filled with water in order to perform pressure test. The gear shall be released at a depth of not more than 4 m. Upon completion of this testing and installation to the initial position, the hydrostatic release gear shall be capable to be released manually, if provided. After that, the hydrostatic release gear is opened for inspection. The gear is deemed to have passed the test, if there is no signs of corrosion and degradation in performance.

.3 after assembly the hydrostatic release gear (if it is included in painter arrangements) is subjected to breaking testing applying a force of at least 10 kN for 30 minutes. If the hydrostatic release gear is installed on the liferaft with a capacity of 25 persons, it is subjected to breaking testing applying a force of at least 15 kN. After the braking testing the gear shall be capable to be released manually, if provided;

.4 performance testing of the gear is carried out using the smallest and biggest liferafts for which the hydrostatic release gears may be used. The liferaft is installed horizontally on a frame or platform having a weight sufficient to submerge the liferaft into water. The hydrostatic release gear and painter are installed in the same way as on the ship board.

The platform where the liferaft is installed is submerged into the water as follows:

horizontally;

with slope angle of 45°, and then 100° so that the hydrostatic release gear is near the upper end;

with slope angle of 45°, and then 100° so that the hydrostatic release gear is near the lower end;

vertically.

In these conditions the hydrostatic release gear shall release the liferaft at a depth of not more than 4 m.

3 Life-saving buoyancy aids

3.1 Testing of type specimens of life-saving buoyancy aids includes:

.1 dimensions and form determining;

.2 strength testing;

.3 tightness testing of metal aid case or air boxes;

.4 stability testing;

.5 buoyancy testing.

3.2 Dimensions L, B, H and form of an aid are checked for compliance with the technical documentation. Here:

L — design length of aid measured between its end points in the centreline, m;

B — design width of aid measured between its end points in the midship plane, m;

H — design height of aid measured between its end points in the centreline, m.

3.3 The strength of the aid shall be checked by dropping it from a height of 10 m into the water. The aid is deemed to have passed the test, if it is free from cracks, dents and breaks.

3.4 The casing of metal aid or air boxes are subjected to tightness testing using one of the following methods:

sequential blowing of compressed air into each compartment up to the excessive pressure of 0.0196 MPa. If on the expiry of 30 minutes the pressure drop according to the installed pressure gauge does not exceed 1% of the excessive one, the compartment is considered tight;

flooding each compartment up to a height of 3 m above its upper horizontal tangent to the compartment. For this purpose, a hose or tube fitted with a nozzle at the lower end for screwing into the compartment and with a glass tube at the upper end is vertically inserted into each compartment. If within 1 hour the water level in glass tube is not dropped, the compartment is considered tight.

3.5 During stability testing the steel or cast iron plumbs with a weight of 14.5 kg are hanged on one of the long aid sides on each sag of lifeline.
If the upper surface of the loaded aid is not covered with water, the aid is considered to be stable.

3.6 During buoyancy testing the aid subjected to strength and tightness testings is fully submerged in the water and conditioned for 24 hours. Upon expiry of the stated time, a load with a weight corresponding to the weight of design number of persons (14.5 kg per each person) is placed on the aid. The load shall be above the water. The aid is deemed to have passed the test, if it is afloat for 1 hour.

4 Lifebuoys

4.1 Testing of type specimens of lifebuoys includes:
  .1 measuring and weighting;
  .2 heat resistance testing;
  .3 frost resistance testing;
  .4 fire resistance testing;
  .5 oil product resistance testing;
  .6 strength testing;
  .7 buoyancy testing.

4.2 When measuring, weighting and inspecting it is stated that internal diameter, weight of a lifebuoy and outfit provided comply with the requirements of technical documentation.

4.3 During heat resistance testing the lifebuoy is placed into a chamber with a temperature of plus 50°C and conditioned for 8 hours. The lifebuoy is deemed to have passed the test, if it is free from damages and form changes, and the linear contraction does not exceed 2% of initial dimensions.

4.4 During frost resistance testing the lifebuoy is placed into the cold chamber with a temperature of minus 30°C and conditioned for 8 hours. The lifebuoy is deemed to have passed the test, if it is free from damages and form changes, and the linear contraction does not exceed 2% of initial dimensions.

4.5 During fire resistance testing the fire-proof vessel with a size of 300 × 350× 60 mm is filled with water up to the mark of 10 mm and with gasoline — up to the mark of 40 mm. The gasoline is ignited and left to burn for 30 seconds. After that, the lifebuoy is hanged at a height of 250 to 500 mm above the upper edge of the vessel and left for 2 seconds. The lifebuoy is deemed to have passed the test, if after removing from flame it does not burn or melt.

4.6 During oil product resistance testing the lifebuoy is fully submerged into diesel fuel to a depth of 100 mm for 24 hours at room temperature. After the testing the lifebuoy shall be free from any damages.

4.7 The lifebuoy is subjected to strength testing after the heat, frost and fire resistance testings:
  Strength testing
    .1 The lifebuoy is dropped 4 times from a height of 10 m onto the water or from a height of 5 m onto the concrete floor. The lifebuoy is deemed to have passed the test, if after the testing it is free from breaks on shell joints and cloths and there is no form changes, and for the lifebuoy with self-igniting buoy — degradation in performance of alarm device;
    .2 The strength of lifebuoy subjected to strength testing by dropping as well as strength of fastening the ends and lifeline to the lifebuoy are checked by sequence hanging a load with a weight of 75 kg for 10 minutes to each section of the lifeline. The lifebuoy is deemed to have passed the test, if there is no sliding of the lifeline and offset of its bead, destruction of lifeline end fastenings as well as breaks of shell joints and cloth;
    .3 The strength of lifebuoy is additionally tested by hanging it for 20 min with secured load with a weight of 90 kg. The lifebuoy and load are hanged on the opposite sides on tapes of 50 mm wide. The lifebuoy is deemed to have passed the test, if after the testing it is free from breaks, cracks or residual deformation.

4.8 The buoyancy testing is carried out after the strength testing. The lifebuoy with hinged load made of steel or cast iron with a
weight of 14.5 kg is submerged into the water for 24 hours. The load shall not secured to the lifeline. The lifebuoy is deemed to have passed the test, if during this time it remains afloat. For the lifebuoy with self-igniting buoy, at the same time the alarm device is checked for capability to continuously flash for 2 hours with light intensity of at least 2 cd.

5 Lifejackets

5.1 Testing of type specimens of lifejackets includes:
   .1 heat and frost resistance testing;  
   .2 fire resistance testing;  
   .3 oil product resistance testing;  
   .4 strength testing;  
   .5 buoyancy testing;  
   .6 stability and convenience testing of lifejacket for adult;  
   .7 stability and convenience testing of infant life jacket;  
   .8 additional testing of inflatable lifejacket.

5.2 The lifejacket is subjected to heat and frost resistance testings in accordance with 4.3 and 4.4. The lifejacket is deemed to have passed the tests, if the shell and inside buoyant material are free from damages (e.g. shrinkage, bulging and cracking).

5.3 The lifejacket is subjected to fire testing in accordance with 4.5. The lifejacket is deemed to have passed the test, if it does not sustain the combustion and does not melt after its removing from the flame.

5.4 The lifejacket is subjected to oil product resistance testing in accordance with 4.6. The lifejacket is deemed to have passed the test, if after the testing its shell and buoyant material are free from damages, bulging and cracking.

5.5 The strength testing of lifejacket is divided into two types: strength testing by applying a force to belt; and strength testing by applying a force along the lifejacket.

During strength testing by applying a force to belt, the lifejacket is submerged into the water for 2 minutes. Then, it is removed from water and fastened as if it is dressed on a person. Then, a force of at least 320 kg for adult lifejacket (Fig. A13.5.5-1) and 240 kg for infant lifejacket is applied to the lifejacket part which secures it on person's body or to the lifting eye for 30 minutes. The specified force is transferred to the adult lifejacket via cylinder of 125 mm in diameter, to the infant lifejacket — via cylinder of 50 mm in diameter.

5.6 During buoyancy testing the lifejacket subjected to strength testing is submerged into the water for 20 minutes. Then a load is placed on the lifejacket so that the lifejacket still could keep it afloat, and weight of this load is measured. After that, the lifejacket is conditioned in submerged condition for
24 hours so that the water layer above its surface is at least 100 mm. At the end of testing a weight of load, which the lifejacket can keep afloat after being conditioned under water, is determined again. The difference between weights of the load in the beginning and at the end of testing shall not exceed 5% of load weight in the beginning of testing.

Fig. A13.5.5-2. Testing of lifejacket applying force longitudinally:
a) vest-type lifejacket; b) collar-type lifejacket; \( P \) — test load

Then the adult lifejacket is loaded with a load made of steel or cast iron with a weight of 20 kg, the infant lifejacket — with a weight of 9 kg, and submerged into the water.

The lifejacket is deemed to have passed the test, if it is free from damages and remains afloat with the specified load for 15 minutes.

5.7 The stability and convenience testing of the adult lifejacket is carried out by at least 6 test persons (including 1 to 2 women) dressed in casual clothes with different height and weight stated in Table A13.5.6

<table>
<thead>
<tr>
<th>Height (m)</th>
<th>Quantity (persons)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4-1.6</td>
<td>1</td>
<td>less than 60 more than 60</td>
</tr>
<tr>
<td>1.6-1.8</td>
<td>1</td>
<td>less than 70 more than 70</td>
</tr>
<tr>
<td>Over 1.8</td>
<td>1</td>
<td>less than 80 more than 80</td>
</tr>
</tbody>
</table>

.1 Test person shall put on a lifejacket without assistance for 1 minute.

.2 Test person dressed in a lifejacket shall swim 25 m and board a liferaft or rigid platform extended by 300 mm above the water surface.

.3 Test person dressed in a lifejacket shall make at least three smooth breast strokes and then relax with head down and partially filled lungs simulating the unconscious condition. From this position the lifejacket shall turn the test person on his back at an angle to the vertical for not more than 5 seconds and support the person’s head above the water so that the mouth is at a distance of at least 120 mm from the water surface.

.4 The test person dressed in a lifejacket shall jump feet-first from a height of 4.5 m into the water. The lifejacket when entering into the water shall not move, cause injury or pain.

5.8 As far as practical, the infant lifejackets shall be subjected to the stability and convenience testing similar to those used for the adult lifejackets. The infant lifejackets are tested using test persons (dummies). The test persons shall be selected so that fully cover all dimensions. At least 6 test persons are required for each height and weight interval.

During testing for turning in water the test person’s mouth shall be above the water after at least 5 seconds.

The average distance from the mouth to the water surface shall be at least 90 mm. The mouth of a separate test person with a height of at least 1.27 m and weight of less than 23 kg shall be above the water of at least 50 mm, and the mouth of test person with a height of more than 1.27 m and weight of more than 23 kg — at least 75 mm.

During testing it shall be determined that the lifejacket does not move, injure, hinder movements inside and outside the water.

5.9 Additional testing of inflatable lifejacket

.1 after testing described in 5.2 to 5.4 the inflatable lifejacket is put in operating condition using the automatic inflation system, manually or orally;

.2 Test person dressed in a lifejacket shall...
The strength of buoyant chambers of the inflatable lifejacket is checked by inflating the chambers manually using the additional pressure 1.25 times higher than operating pressure when safety valves are closed. The inflatable lifejacket is deemed to have passed the test, if after holding the pressure for 30 minutes it is free from any damages.

A lifejacket one buoyant chamber of which is not inflated is subjected to buoyancy, stability and convenience testing.

### 6 Immersion suits

**6.1** Testing of type specimens of immersion suits includes:

- **.1** heat and frost resistance testing
- **.2** fire resistance testing
- **.3** strength testing
- **.4** buoyancy testing
- **.5** watertightness testing
- **.6** convenience testing

**6.2** An immersion suit is subjected to heat and frost resistance testing in accordance with the requirements of 4.3 and 4.4. The immersion suit is deemed to have passed the test, if it is free from any damages, cracking and bulging.

**6.3** The immersion suit is subjected to fire resistance testing in accordance with the requirements of 4.5. The immersion suit is deemed to have passed the test, if it does not sustain the combustion and does not melt after its removing from the flame.

**6.4** The immersion suit is subjected to strength testing in accordance with 5.5. However, the applied load shall be 1350 N (if required, during testing the immersion suit may be cut for special arrangements). The immersion suit is deemed to have passed the test, if after the testing it is free from damages.

**6.5** The immersion suit not requiring the lifejacket is subjected to buoyancy testing in accordance with 5.5. The immersion suit is deemed to have passed the test, if its buoyancy is not decreased by more than 5% after submerging it into water for 24 hours.

**6.6** Watertightness testing:

- **.1** before testing a weight of test person dressed in the wetted immersion suit is determined. After 1 hour in water, the test person dressed in the immersion suit is weighted again. The immersion suit is deemed to have passed the test, if the weight of ingress water for this time does not exceed 200 g;
- **.2** the method specified in .1 determines the water quantity in the immersion suit after the test person jump into the water from a height of 4.5 m. The immersion suit is deemed to have passed the test, if during jumping it is not shifted and damaged, and the weight of ingress water does not exceed (500±50) g.

**6.7** In order to test the convenience, the test men are selected in accordance with 5.7.

If the immersion suit requires to put on a lifejacket, it shall be put over the immersion suit:

**Testing procedure**

- **.1** the test person shall correctly put on the immersion suit without assistance for not more than 2 minutes;
- **.2** the test person shall steadily swim on calm water faceup. His mouth shall be not lower than 120 mm above the water surface. Then, the test person relaxes and down the head simulating the unconscious condition. From this position the immersion suit design shall turn the person on back faceup for 5 seconds;
- **.3** the test person dressed in an immersion suit shall jump from a height of 4.5 m and remain in water with a temperature of plus 5°C. for 1 hour. After that, the temperature of test person’s body is measured. It shall not be decreased by more than 2°C.

### 7 Thermal protection aids

**7.1** Testing of type specimens of the thermal protection aids includes:

- **.1** watertightness testing of material and thermal resistance testing of thermal protection aid;
- **.2** heat and frost resistance testing;
- **.3** oil product resistance testing;
- **.4** convenience testing.
7.2 During watertightness testing of material it shall be determined that the material used for manufacturing the thermal protection aid is capable to maintain its watertightness when affected by water column of a height of 2 m.

The testing shall determine that heat transfer coefficient of the thermal protection aid is not more than 7800 W/(m²·K).

7.3 The thermal protection aid is subjected to heat and frost resistance testing in accordance with 4.3 and 4.4. The aid is deemed to have passed the test, if during inspection it is free from damages.

7.4 Oil product resistance testing:

The thermal protection aid after closing of all openings is subjected to the oil product resistance testing in accordance with 4.6. The aid is deemed to have passed the test, if after cleaning its surfaces, after testing and inspecting, it is free from damages and the heat transfer coefficient does not exceed 7800 W/(m²·K).

7.5 In order to carry out the convenience testing the test persons are selected in accordance with the stability and convenience testings of the adult lifejacket.

The test persons located in a life-saving mean afloat unpack the thermal protection aid and put it on over the lifejacket without assistance.

If the test persons being in water and dressed in the thermal protection aid take it off for not more than 2 minutes without assistance, the aid is deemed to have passed the test.

8 Launching and evacuation arrangements

8.1 Testing of type specimens of the launching and evacuation arrangements includes:

.1 performance and strength testing of launching arrangement;
.2 heat, frost and fire resistance testing of marine evacuation chute;
.3 strength testing of marine evacuation chute;
.4 convenience testing of marine evacuation chute.

8.2 Performance and strength testing of launching arrangement

.1 Lifeboat and liferaft davits and lifeboat launching arrangements are tested by the test static load 1.5 times higher than their maximum operating load. The lifeboat completely swung overboard is overbalanced by making an arc of approximately 5 on either sides from vertical in the planned longitudinal plane. The testing is first carried out when the ship is in upright position, and then — imitating the heel of 15 to one and another side.

Upon completion of this testing there shall be no significant deformation of arrangements or any other damages;

.2 The test static load 1.5 times higher than the operating load is applied to the winch drums with maximum permissible number of hoses. Such a load shall be maintained using the brakes. Then, this load is decreased by at least one full lap of drum axis. The test load 1.1 times higher than the operating load is decreased with maximum speed to a distance of 3 m and hard braked using the manual brakes. As result of testing, the brakes shall operate properly;

.3 The winch operation is checked using the manual drive, if it is provided by the winch design;

.4 The launching time of lifeboat completed with design number of persons and outfit is checked. The launching arrangement is deemed to have passed the test, if the launching time including the time for preparation and swung overboard does not exceed 5 minutes.

8.3 The marine evacuation chute is subjected to heat, frost and fire resistance testing in accordance with the guidelines of 4.3 to 4.5. The marine evacuation chute is deemed to have passed the test, if when activating it after testing there are no hull cracking, joint deformations and other defects.

8.4 Strength testing of marine evacuation chute:

.1 Buoyancy chambers of the marine evacuation chute when safety valves are closed are inflated with compressed air up to the
pressure 2 times higher than the operating pressure. The marine evacuation chute is deemed to have passed the test, if the pressure in its buoyancy chambers does not fall by more than 5% for 10 minutes and there is no damages of the structure;

.2 Ends of the marine evacuation chute inflated up to the operating pressure are installed on a rigid base at low height. The middle part of the chute is loaded with the distributed load with a weight up to 150 kg (1.47 kN). The marine evacuation chute is deemed to have passed the test, if it is not folded and deformed.

8.5 In order to carry out the convenience testing of the marine evacuation chute, the test persons are selected in accordance with 5.7. Here:

.1 The marine evacuation chute packed in container or case is installed at a height of its installation on board the ship. One test person activates it. Another test person fastens the end of the marine evacuation chute to a life-saving appliance (lifeboat or liferaft). The slope angle of the marine evacuation chute relative to horizon is visually fixed. It shall be within 30° to 35°.

The marine evacuation chute is deemed to have passed the test, if the actuation time does not exceed 5 minutes;

.2 The marine evacuation chute is installed in order to lower persons dressed in the lifejackets. The marine evacuation chute is deemed to have passed the test, if the surface of launchway is free from damages. It shall be shown that the pressure loss in any buoyant chamber of the marine evacuation chute does not restrict its application as an evacuation mean.
GUIDELINES FOR PYROTECHNIC SIGNAL MEANS TYPE SPECIMEN TESTING

1 Thermal stability and cold resistance test

1.1 Two specimens of each pyrotechnic signal mean shall undergo tests in accordance with Guidelines for lifebuoys on thermal stability and cold resistance (see 4.2, 4.3 Appendix 13). Signal means are considered as having passed tests if there is no any damages, cracking and blistering, and they operate normally when commissioned right after tests.

2 Strength test

2.1 Two specimens of each pyrotechnic signal mean are thrown on the concrete floor from height of 2 m. Signal means are considered as passed the test if there is no any damage, and they operate normally when commissioned.

3 Water resistance test

3.1 Two specimens of each pyrotechnic signal mean are immersed in water to a depth of 100 mm for 24 hours. Signal means are considered as passed the test if they operate normally when commissioned, and all instructive signs and figures on the housing are readily visible.

4 Operational tests

4.1 The tester performs without assistance manual start of two specimens of each pyrotechnic signal mean barehanded and gloved.

4.2 When firing rocket parachute flares the tester shall confirm visually that the rocket actuates on the height of about 300 m without damaging the parachute and its fixtures. He also shall document:
   - rocket burning period that should be not less than 40 s;
   - rocket lowering time from the trajectory apex.
   Then the rocket lowering speed shall be determined; it shall be not more than 5 m/s.

4.3 When road flares are actuated, the tester shall note the burning period at ambient temperature of one of road flares. It should be not less than 1 min. The second road flare shall be immersed in water to a depth of 100 mm after 30 s of burning. The road flare shall continue burning for min. 10 s.

4.4 The working efficiency of each pyrotechnic signal mean with air flow rate not less than 30 m/s is tested through laboratory tests with using fan. Pyrotechnic signal mean are considered as passed the test if they do not extinguish at that air flow speed.
TESTS OF ELECTRICAL, RADIO AND NAVIGATIONAL EQUIPMENT

1 INSULATION RESISTANCE

1.1 Equipment and electric cables insulation resistance as related to ship’s hull and also between phases/poles, measured during tests that are carried out after the ship’s construction, shall be not less than designated in the Table A15.1.1-1:

<table>
<thead>
<tr>
<th>Electrical equipment</th>
<th>Before testing</th>
<th>After testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical machinery</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Transformers</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Distribution boards</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>Commutation, protection and control facilities (undisturbed)</td>
<td>10</td>
<td>—</td>
</tr>
<tr>
<td>Ship control, communication and signalization equipment</td>
<td>20</td>
<td>—</td>
</tr>
<tr>
<td>Space heaters</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Lamps/projectors</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>Mounting installations</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Static frequency converters</td>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>

DC voltage provided by a megohm meter during insulation resistance measuring shall be not less than specified in Table A15.1.1-2.

<table>
<thead>
<tr>
<th>Rated voltage, V</th>
<th>Lowest test voltage, V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 50</td>
<td>100</td>
</tr>
<tr>
<td>51 to 100</td>
<td>250</td>
</tr>
<tr>
<td>101 to 500</td>
<td>500</td>
</tr>
<tr>
<td>501–7200</td>
<td>1000</td>
</tr>
<tr>
<td>Over 7201</td>
<td>2500</td>
</tr>
</tbody>
</table>

1.2 Every electric circuit can be divided in various number of sections using installed consumers circuit-breaker.

In fire hazardous premises insulation resistance measurement shall be performed after premises ventilation with 10 air changes.

1.3 Measurement of insulation resistance is to be performed immediately after waterproof testing:

for all power distribution devices insulation resistance is measured between every bus and enclosure and between buses of various phase or pole. Insulation measuring is to be performed with automatic circuit breakers and signal lamps remote fuses, voltmeters and other electric meters disabled; semiconductors and semiconductor devices should be disabled;

for generators and electric motors insulation resistance shall be measured before and after testing (not later than 1 hour after electrical equipment action tests). Insulation resistance is measured between windings and the enclosure, and between every winding;

for electrical cables insulation resistance is measured between every cable conductor and earth and between all cable conductors.

1.4 Insulation resistance data from megohm meter shall be fixated after applied voltage become steady voltage.

2 INSULATION DIELECTRIC STRENGTH

2.1 Equipment insulation dielectric strength except for separate types listed in 2.2-2.4 is tested within 1 min by applying listed in Table A15.2.1, alternating sinusoidal voltage of frequency 50 Hz in normal weather conditions.
Table A15.2.1

<table>
<thead>
<tr>
<th>Rated voltage, V</th>
<th>Test AC voltage (RMS value), V</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 and less</td>
<td>500</td>
</tr>
<tr>
<td>61 to 250</td>
<td>1500</td>
</tr>
<tr>
<td>251 to 500</td>
<td>2000</td>
</tr>
<tr>
<td>501 to 1000</td>
<td>2 per each Volt of rated voltage +1000</td>
</tr>
<tr>
<td>1001 to 2500</td>
<td>6500</td>
</tr>
<tr>
<td>2501 to 3600</td>
<td>10000</td>
</tr>
<tr>
<td>3601–7200</td>
<td>20000</td>
</tr>
<tr>
<td>7201–10000</td>
<td>28000</td>
</tr>
</tbody>
</table>

2.2 Electrical machines/electromagnetic couplings windings connection insulation shall be tested in machine/coupling no-load condition. Tests are performed on heat machine/coupling with temperature close to the maximum temperature during heating test. Test voltage shall be equal to 1.3 of rated voltage. Test time is 3 min (for turbine generator – 5 min.) unless particular cases are specified.

2.3 During transformer windings insulation testing windings should withstand test voltage listed in Table A15.2.3.

Table A15.2.3

<table>
<thead>
<tr>
<th>Voltage, V</th>
<th>test</th>
</tr>
</thead>
<tbody>
<tr>
<td>rated</td>
<td></td>
</tr>
<tr>
<td>Up to 1000</td>
<td>2700</td>
</tr>
<tr>
<td>1001–3000</td>
<td>9600</td>
</tr>
<tr>
<td>3001–6000</td>
<td>15400</td>
</tr>
<tr>
<td>6001–10000</td>
<td>21600</td>
</tr>
</tbody>
</table>

Transformer windings connection insulation shall be tested by applying to ends of one winding overfrequency doubled voltage with other windings open. The test time is at least 15 s.

For current transformers connecting insulation of secondary side shall withstand in open position test voltage that is induced in it during rated current flowing in primary for 1 minute.

Testing by throwing on an impact load (instantaneous rise and drop of voltage by disabling without an arc with vacuum circuit breaker) on rated voltage shall be provided by transformer actuation on rated voltage 5 times. Occurrences accompanying turn-to-turn short circuit (noise change, smoke appearance, winding insulation colour changing and other occurrences indicating transformer’s non-satisfactory condition) shall not be found.

2.4 Test voltage for fuses designed for voltage lower than 500 V shall be 3000 V.

2.5 During cables testing every isolated conductor of precut cable shall withstand for 5 minutes without rupture applying single-phased alternating sinusoidal voltage with frequency of 50(60) Hz or DC voltage stated in Table A15.2.5. This test voltage for precut cable either after for water stored cable or without such storage, either with or without immersion in water.

Cable tests are considered as positive if no insulation rupture or surface flashovers are detected.

Table A15.2.5

<table>
<thead>
<tr>
<th>Cables</th>
<th>Test voltage at current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage, V</td>
<td>AC</td>
</tr>
<tr>
<td>power cables at rated voltage, V</td>
<td></td>
</tr>
<tr>
<td>up to 250</td>
<td>1500</td>
</tr>
<tr>
<td>251–750</td>
<td>2500</td>
</tr>
<tr>
<td>751–1000</td>
<td>3000</td>
</tr>
<tr>
<td>1001 to 3000</td>
<td>7000</td>
</tr>
<tr>
<td>3001 to 10000</td>
<td>15000</td>
</tr>
<tr>
<td>cables of signalization and communication at rated voltage of 250 V</td>
<td>1500</td>
</tr>
</tbody>
</table>

Notes: 1. Tables requirements apply to cables with rubber, PVC and polyethylene insulation or PVC enclosure.
2. Test voltage for cables which nominated voltage is not indicated in the Table shall be determined in technical documentation.
3. For cables with shielded conductors if they exceed 50% of all conductors, tested voltage can be lowered on 25% in comparison with voltage designated in the Table.

3 FUNCTIONAL TESTS

3.1 Every equipment specimen is subject to functional tests prior to separate tests types.

For tests performance it should be determined that equipment complete set, spares and insulation resistance are in accordance with technical documentation.
3.2 Equipment tests shall be performed for the nominal ratings covered by technical documentation, and in normal weather conditions.

3.3 During the test needed measurements and calibration are performed. Characteristics are determined both with rated power voltage and frequency, and with prolonged (instantaneous) (see 2.2.1 Part VI RCCS) deviations:

- with prolonged voltage deviations on +6\% and -10\% and frequency deviations on ±5 \%;
- with instantaneous voltage deviations on +15 \% and -30 \% and frequency on ±10 \%. Instantaneous voltage deviation duration - not more than 1.5 s, instantaneous frequency deviation – 5 s.

3.4 Equipment intended for supplying from batteries shall be tested with voltage deviation from rated value within +30 \% to -25 \% (for equipment supplied from battery attached to charger) and +20 \% to -25 \% (for equipment not attached to the charger during charging).

3.5 Measurements results and characteristics matching to values specified in the technical documentation, and equipment working efficiency in given parameters are tested.

For equipment operated at the load calibration performed on reaching steady state working temperature.

4 OVERSPEED AND OVERLOAD TESTS

4.1 Overspeed test shall be performed after short overcurrent test, and for electrical machinery tested for stop under load current - after stop under load current tests. The test is performed at electrical machinery parts temperature close to steady temperature reached by the end of heating tests. The test time for all electrical machinery except for starter is 2 min (for starters — 20 sec).

4.2 Electrical machinery with series excitation shall be tested at rotation speed exceeded the biggest stated in the datasheet data by 20\%, but not exceeded rated rotation speed more than 50\%. Starters shall be tested at 120\% of idle speed.

4.3 Electrical machinery with regulated rotation speed and with several rated rotation frequency shall be tested at rotation frequency exceeded the biggest stated value on rating plate by 20\%. All other electrical machinery is tested at rotation frequency exceeded rated frequency speed by 20\%.

4.4 Alternating current generators overcurrent test is performed at load power factor of 0.6 (\(\cos \varphi = 0.6\)) with current of 150\% of rated during 120 s. Direct current generators test is performed with current of 150\% of rated during 15 s. The tests are considered as successful if generator's voltage does not reduce more than by 10\%.

5 SHORT-CIRCUIT SURGE CURRENT RESISTANCE TESTS

5.1 Electrical machinery short-circuit surge current resistance tests shall be performed if the following conditions have been fulfilled:

- Short circuit mode shall be created by sudden simultaneous short circuit of all 3 phases (poles) while machinery runs idle at voltage of 105\% of rated, and with automated voltage control devices engaged.
- Electrical machinery power during the test shall be not less than rated power.
- Length of conductors from electrical machinery to closing appliance shall be minimal, cross sectional area shall be maximal of all provided in technical documentation for the generator; conductors material shall be copper.
- Short-circuit mode parameters shall be oscillographed.
- Test result evaluation shall be performed by its detailed examination, especially examination of stator winding face parts, welds and other mechanical joints condition and fastening, and also on the results of insulation electric strength test performed after short-circuit current resistance test.

5.2 Electrical machinery above 1000 kW/A test results evaluation shall be performed in accordance with readings obtained from strain-gauging (deformations value determination on parts surface), stresses in active steel
fasteners and their parts fronts insulation, and as a result of vibration measurement of these parts. Stress limits norms shall be stated upon agreement with the River Register.

6 VIBRATION RESISTANCE TESTS

6.1 Vibration resistance tests of disabled equipment are performed within band of 2-80 Hz (Table A15.6.1). Tests shall be performed in three mutually perpendicular planes; one of them shall be working plane.

6.2 Tests on resonant frequencies detection is performed in same sub-band and amplitude as were used during vibration resistance tests (Table 15.6.5) for all sub-bands. Equipment shall be rigidly (without shock absorbers) attached direct to the test bench platform.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Test</th>
<th>Amplitude, mm</th>
<th>Time, h</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-8</td>
<td></td>
<td>1.4</td>
<td>36</td>
</tr>
<tr>
<td>8-16</td>
<td></td>
<td>0.7</td>
<td>24</td>
</tr>
<tr>
<td>16-31.5</td>
<td></td>
<td>0.35</td>
<td>24</td>
</tr>
<tr>
<td>31.5-63</td>
<td></td>
<td>0.17</td>
<td>12</td>
</tr>
<tr>
<td>63-80</td>
<td></td>
<td>0.10</td>
<td>12</td>
</tr>
</tbody>
</table>

Resonant frequencies search shall be performed by smooth frequency shift within every range with constant amplitude. Smooth frequency shift time within the range shall be not less than 2 minutes. Detected resonant frequencies shall be recorded both for equipment in general and for separate assemblies or parts to take them into account in subsequent vibration resistance tests. Amplitude increasing under resonance greater than 5 times as compared to connection points vibration amplitude is unacceptable.

6.3 Equipment vibration resistance test is performed when equipment is disabled, in such range stated in Table A15.6.1 where resonance appears; if there is no resonance within the range of 16 to 31.5 Hz, use amplitude 0.35 mm. The method of fastening the equipment to the test bench platform shall be the same as used in operation. Tests are performed by short-term vibration.

6.4 Vibration resistance tests shall be performed when equipment is operable under electrical load (under voltage for equipment having no load). Load is stated in test load and method of each equipment. The method of fastening the equipment to the test bench platform shall be the same as used in operation.

6.5 Frequency bands and amplitudes during vibration resistance test are shown in Table A15.6.5. Test time is the time needed for checking in operation and appearance of resonance in all equipment and its parts, but not longer than 2 h on every resonating frequency (if any) or on a frequency where parameters stability are violated.

The test shall be performed by smooth frequency shift under constant amplitude within every range. Smooth frequency shift time within every range shall be not less than 2 minutes.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Amplitude, mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-8</td>
<td>1.0</td>
</tr>
<tr>
<td>8-16</td>
<td>0.5</td>
</tr>
<tr>
<td>16-31.5</td>
<td>0.25</td>
</tr>
<tr>
<td>31.5-63</td>
<td>0.12</td>
</tr>
<tr>
<td>63-80</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Note: For electrical equipment installed on engines and other elevated vibration sources test norms can be extended.
6.6 Equipment is considered to have passed the test if switch contact positions did not change, work instability was not detected, parameter values did not exceed permissible limits, no broken parts, conductive wires brake, moving parts jamming, fastenings loosening or insulation deterioration were detected.

Note: Tests required by this Section are for equipment of weight less than 200 kg. Equipment of weight more than 200 kg can be tested block by block.

7 IMPACT AND SHOCKPROOF TESTS

7.1 Impact tests are performed when equipment is disabled; shockproof tests are performed when equipment is operable in three mutually perpendicular planes; one of them shall be working plane. The method of fastening the equipment to the test bench platform shall be the same as used in operation.

7.2 Test parameters: impact test: min. 1000 impacts with 7g acceleration and frequency of 40 to 80 impacts per minute; shock-proof test: min. 20 impacts with 5g acceleration and frequency of 40 to 80 impacts per minute.

Equipment is considered to have passed the test if no mechanical damages and breakages, fastening and contacts loosening and other events disturbing apparatus, devices and equipment normal operation are detected.

7.3 Portable VHF equipment shall withstand additional impact tests performed by dropping it on the hard surface from height of 1 m.

The test surface shall consist of hard wood solid peace of thickness not less than 150 mm and weight of over 30 kg. The height of equipment lowest point relative to test surface at the moment of dropping shall be (1000+10) mm.

A set of six droppings to the test surface is performed: one dropping per each equipment side. Equipment operating check and inspection for the presence of external damages.

Equipment is considered to have passed the test if no remarks on equipment operation check or visible damages that can prevent its operation are detected.

Note: Tests required by p.p. 7.1 and 7.2 are for equipment of weight less than 200 kg. Equipment of weight more than 200 kg can be tested block by block.

8 TESTS ON ROLLING RESISTANCE AND LONG-TERM SLOPE RESISTANCE

8.1 Equipment is tested in two mutually transverse directions. The method of fastening the equipment to the test bench platform shall be the same as used in operation.

During roll resistance tests the limit tilt angle from the vertical line is –22.5°, roll period is 4 s. Test time shall be sufficient for functional testing, but not more than 15 min in every position.

8.2 During long-term slope resistance tests equipment is kept sequentially in two mutually transverse directions with inclination at an angle of ±22.5, emergency equipment - at an angle of ±30°. Test time shall be sufficient for functional testing, but not more than 15 min in every position.

8.3 Equipment is considered to have passed the test if no false alarms under the influence of rolling and long-term slopes or breakdowns were detected during operation check.

9 HEAT STABILITY TESTS

9.1 When equipment is enabled, the working temperature stated in 9.2, 9.3 is set in the chamber with temperature increase rate of (±0.5) °C/min. Relative humidity shall be not more than 20%. Working temperature shall be kept within 16 h. Then equipment operation check is performed at least three times (when heat balance is reached, at the end of test mode and after tests in cold state).

9.2 Equipment (except for electrical machinery and lamps), designed for installation in premises where ambient temperature does not exceed 40 °C shall be tested on heat stability with working ambient temperature of 40 °C.
9.3 Equipment installed on the open deck, in engine room and galley, and also radio and navigational equipment installed on the open deck and in the ship interior spaces, shall be tested on heat stability with working ambient temperature of 55 °C.

9.4 Check of equipment operation at limit voltage and frequency deviations shall be performed after heat stability tests at the end of holding regime.

Equipment is considered to have passed the test if no events disturbing its normal operation are detected, parameters did not exceed accepted values during the tests, and insulation dielectric strength tests and insulation resistance measurement on the hot item at the end of tests gave satisfactory results.

9.5 Heat stability test of electrical machinery and their components in steering control systems and power installation electrical control systems shall be performed on enabled (operated) electrical machinery. During the heat stability tests specimen temperature is raised to 55 °C within 30 minutes. After that this temperature is kept for 16 h. Then tests on equipment adequate operation are performed to confirm its datasheet specifications.

10 COLD RESISTANCE TESTS

10.1 Equipment intended for installation indoors shall be tested in chamber within 6 h at temperature of −10 °C; equipment intended for installation on the open deck shall be tested at the temperature of −40 °C. After that this temperature is kept for 16 h. Then tests on equipment adequate operation are performed to confirm its datasheet specifications.

10.2 Items check on limit voltage and frequency deviations are performed right after its switch to operation condition after cold chamber.

10.3 Temperature change speed shall be not more than (3±0,5) °C/min. Equipment is considered to have passed the test if no faults, breakages and parameters deviations are detected.

10.4 During cold resistance tests of electronic device in steering control systems and systems of power installation or its components control, the item should be shut down, cooled to −25 °C and kept on this temperature within 2 h. Then temperature shall be increased to −10 °C, and tests on equipment adequate operation are performed to confirm its datasheet specifications.

11 HUMIDITY RESISTANCE TESTS

11.1 Equipment intended for installation on ships shall be tested on humidity resistance at air relative humidity of (95±3) % and temperature of +25 °C for 5 days; equipment installed on ships navigated in tropical area - for 7 days. Equipment of all versions shall be tested fully assembled in regular casing, except for sealed equipment, which hatches shall be open during tests in chambers.

11.2 Equipment is considered to have passed the test if no insulation breakdowns or resistance drop below the value stated in Section 1 of this Appendix are detected, and item parameters deviations did not exceed accepted values when equipment was in test medium, or equipment was in operated mode not less than 2 h.

12 TESTS ON SALT (SEA FOG) INFLUENCE

12.1 All items installed on river-sea navigation ships shall be tested.

12.2 Equipment is tested in regular enclosure with covers and doors shut down, with plugged feed-through holes. All other holes (for example, ventilation holes) shall be open.

12.3 Tests are performed by cyclical spraying (15 minutes for each hour of testing) in chamber aqueous solution of salt (sea fog) at temperature of +(27±2) °C:

solution composition (g/l): sodium chloride — 27, magnesium chloride — 6, calcium chloride — 1, potassium chloride — 1, distilled water — 1 l

fog dispersity — 1 to 10 μm (up to 90 to 95 drops)
solution water content — 2 to 3 g/m² (at the end of spraying).
12.4 Test time depending on installation location:
7 days — for equipment installed on open decks;
2 days — for equipment installed in the inside spaces.

12.5 Equipment operation shall be checked after tests. Equipment is considered to have passed the test if no corrosion, paint coatings softening and disruption, and events disturbing its normal operation are detected.

13 ENCLOSURE PROTECTION TESTS

13.1 Equipment shall be subject to bench tests depending on its enclosure protection type. These tests apply to items with voltage lower than 1000 V. Protection level testing methods for voltage over 1000 V are developed in accordance with Electrical Installations Code.

13.2 Equipment shall be checked for efficiency of protection from access to its dangerous parts or foreign solid bodies and water penetration inside the item. Equipment protection level depending on installation place is stated in 2.3.6 Part VI of RCCS, and designations and characteristics of equipment protection level are stated in Appendix 1 Part VI of RCCS.

13.3 This para determines method of equipment enclosures testing depending on equipment level of protection against foreign solid bodies penetration inside the enclosure. Protection level is designated with the first characteristic digit:

1. The IP protection level equipment has no protection for characteristic digit 0 and can be used on board ships if built in the enclosure with adequate protection level;

2. Equipment of type IP for protection level characteristic digit 1. Application of sphere with diameter of 50 mm to any holes in enclosure with force of 30 N for all items and 50 N for electrical machinery;

3. Equipment of type IP for protection level characteristic digit 2. Application of tracing probe in any possible position with force up to 30 N and application of sphere with diameter of 12.5 mm to any holes with same force;

4. Equipment of type IP for protection level characteristic digit 3. Application of test bar with diameter of 2.5 mm with force up to 3 N should not lead to penetration inside the enclosure through any hole;

5. Equipment of type IP for protection level characteristic digit 4. Application of test bar with diameter of 1.0 with force up to 1 N should not lead to penetration inside the enclosure through any hole;

6. Equipment of type IP for protection level characteristic digit 5. Inside the chamber shall be induced vacuum adequate for differential pressure $2 \times 10^3$ Pa. Equipment is blown with talc sifted through a sieve with square mesh clear spacing dimension of 75 μm, in an amount of 2 kg of talc for 1m$^3$ of chamber volume. The test is performed as long as it needs for pumping with vacuum pump air volume in chamber 80-120 times more than air volume in the enclosure, but not less than 2 h;


13.4 Evaluation of test results of equipment with type IP on foreign solid bodies penetration inside the enclosure:

1. Results are considered as successful for first characteristic digits 1, 2, 3, 4 if probe fullest cross section does not penetrate through any of holes and does not contact with current-carrying and moving parts inside equipment enclosure.

2. Results are considered as successful for first characteristic digit 5 if amount of talc penetrated inside equipment enclosure did not affect on its satisfactory performance (equipment efficiency and parameters are checked).

3. Results are considered as successful for the first characteristic digit 6 if talc does not penetrate inside the equipment enclosure (full dust protection).

13.5 This para determines method of equipment enclosures testing depending on
equipment level of protection against water penetration inside the enclosure. Protection level is designated with the second characteristic digit:

.1 The IP protection level equipment has no protection for characteristic digit 0 and can be used on board ships if built in the enclosure with adequate protection level.

.2 Equipment of type IP for protection level characteristic digit 1 is tested on protection efficiency from simulated rainfall vertical falling drops penetration inside the equipment. Tested equipment is mounted in normal working position under the reservoir created uniform drops falling on all enclosure surface. Swivel table, where enclosure is mounted, shall have rotation speed of 1 RPM and maximum off-centre distance about 100 mm. Test time is 10 min.

.3 Equipment of type IP for protection level characteristic digit 2 is tested on protection efficiency from simulated rainfall drops penetration inside the equipment. Tested equipment is exposed to rain with intensity of 3 mm/min. Equipment is mounted in four fixed positions with 15° slope. Test time is 2.5 minutes in every position. Total test time is 10 min.

.4 Equipment of type IP for protection level characteristic digit 3 is tested on protection efficiency from spray penetration inside the equipment. Tested equipment is exposed to spray from all directions at an angle of ±60° to the vertical line, created by special device with water pressure in supply pipe not less than 0.1 MPa. Test time is 1 min per 1 m² of the calculated surface; minimum test time is 5 min.

.5 Equipment of type IP for protection level characteristic digit 4 is tested on protection efficiency from blanket spraying penetration inside the equipment. Tested equipment is exposed to spray from all directions at an angle of ±180° to the vertical line, created by special device with water pressure in supply pipe not less than 0.1 MPa. Test time is 1 min per 1 m² of the calculated surface; minimum test time is 5 min.

.6 Equipment of type IP for protection level characteristic digit 5 is tested on protection efficiency from water penetration inside the equipment. Tested equipment exposed to water jet spilling from all directions using hose with nozzle inner diameter 6.3 mm from the distance of 2.5-3.0 m. Water pressure shall be not less than 0.1 MPa to get water discharge 12.5 l/min. Test time is 3 min.

.7 Equipment of type IP for protection level characteristic digit 6 is tested on protection efficiency from water penetration inside the equipment. Tested equipment exposed to strong water jet spilling from all directions using hose with nozzle inner diameter 12.5 mm from the distance of 2.5-3.0 m. Water pressure is adjusted to get water discharge 100.5 l/min ±5%. Test time is 3 min.

.8 Equipment of type IP for protection level characteristic digit 7 is tested on protection efficiency from submergence. Equipment is fully immersed so that water height to the upper part is not less than 0.15 m. Test time is 30 min. Equipment is considered to have passed the test if no water penetrates the enclosure at the specified pressure and in specified time.

.9 Equipment of type IP for protection level characteristic digit 8 is tested on protection efficiency from submergence. Unless there is a standard for equipment, test conditions shall be tougher than conditions stated by previous para. It shall also be taken into account that in operating conditions enclosure will be immersed for indefinitely long time (upon agreement). Equipment is considered to have passed the test if no water penetrated equipment enclosure at noted pressure and time.

13.6 For evaluation of test results of equipment with type IP on water penetration inside the enclosure, the following shall be considered:

Water penetration inside the enclosure is acceptable:

for equipment of type IP with second characteristic digits 1, 2, 3, 4 in the form of separate merged together drops of size not more than 30 mm;

for equipment of type IP with second characteristic digits 5 and 6 - in the form of separate drops.
In any case, if definite quantity of water penetrate the enclosure, there must not be:
- equipment perturbation of the normal operation and safety;
- water storage on electrically insulating materials, where water may cause arc tracking;
- water ingestion on parts being under voltage;
- water storage close to cable inlets or water insertion inside cables.

For equipment of type IP with second characteristic digits 7 and 8 water penetration is not allowed.

Equipment is considered to have passed the test if technical characteristics and/or working efficiency and/or electrical safety correspond to given requirements.

13.7 Generally, equipment enclosure protection tests are performed without power supply. Separate types of electrical equipment (if specified by requirements or testing program) can be tested with power supply. Safety measures must be adopted during such tests.

14 ELECTROMAGNETIC COMPATIBILITY TESTS

14.1 General provisions

Check of stress level and field strengths of industrial radio interference created by equipment is performed in accordance with ГОСТ 30805.16.1.1 (СИСП16-1-1), using measuring receivers with quasi-peak detector.

For measuring the level of:
- radio interference voltage artificial network and measuring receiver with quasi-peak detector shall be used. Receiver's band width during measuring must be 200 Hz in frequency band of 10 to 150 kHz, and 9 kHz in frequency band of 150 kHz to 30 MHz;
- in case of intensive radio interference a receiver with the band width of 9 kHz in frequency bands of 150 kHz to 30 MHz and 156 to 165 MHz, and with the band width of 120 kHz in frequency bands of 30 to 156 MHz and 165 MHz to 2 GHz shall be used.

Equipment is divided on the following categories:
- portable;
- protected from direct effects of weather conditions;
- non-protected from direct effects of weather conditions;
- immersed or having constant contact with water;

Nomenclature of equipment electromagnetic compatibility tests is specified in Table A15.14.1.

14.2 Electromagnetic interferences measurement

14.2.1 During interferences measurement tested equipment shall operate in normal conditions, and position of control elements affected on interferences (both conducted and

<table>
<thead>
<tr>
<th>Items</th>
<th>Radio interference level test</th>
<th>Electromagnetic interference stability test (EMI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Generators</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2. Electric motors</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3. Converters</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4. Distribution systems</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>5. Electrical apparatus (switching, protecting etc.)</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>6. Electric meters</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>7. Transformers</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>8. Electrical equipment for internal combustion engines with starter</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>9. Lamps and gas-discharge lamps control equipment</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>10. Ship control, communication and signalization equipment</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>11. Automation equipment</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>12. Radio interferences protection filters</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>13. Communication and navigation equipment and other electronic equipment</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

1 For navigation lights commutators.
2 For gas-discharge lamps.
3 For motor telegraphs, blades and rudder blade position indicators, tachometers, telephone switchboards, light, signal and sound devices apparatus, closers.
radiated) must be as to determine maximum interference level created by tested equipment. If needed equipment has several power modes, for example, "operation", "availability" etc., then the mode creating the max level of interference must be determined, and all measurements shall be performed for this mode. Equipment antenna's terminals shall be connected to non-radiative dummy antenna.

Allowable levels of created electromagnetic interferences during tests are specified in Table 2.7.3-1, Part VI of RCCS.

14.2.2 Conducted interferences (all equipment categories except for portable).

During tests shall be measured any signals generated by equipment or appeared on its power supply connection ports (terminals), that can disturb normal operation of other equipment if being included in ship's power mains.

For interferences measurements measuring receiver with quasi-peak detector shall be used. During tests equipment shall be connected to a separate power supply using artificial network to provide specific impedance on power supply terminals for high frequencies and elimination of undesired effect of external interferences incoming from common power supply. Receiver's band width must be 200 Hz when measuring in frequency band of 10 to 150 kHz, and 9 kHz when measuring in frequency band of 150 kHz to 30 MHz.

Connection cables between tested equipment power supply terminals (AC and DC) and artificial network must be shielded, and their length shall not exceed 0.8 m. If tested equipment consists of several devices with individual ports for AC and DC, then power ports with similar voltage rate may be connected in parallel with artificial network.

During measurements performance all metering equipments and tested equipment shall be mounted on a grounded surface and connected to it. If grounded surface using is impossible, then equivalent earthing must be performed on tested equipment metal frame or enclosure.

Radio frequencies voltage on power supply terminals of tested equipment in the band of 10 kHz to 30 MHz shall not exceed limit values specified in Fig. A15.14.2.2

14.2.3 Interferences radiated by equipment enclosure port (all equipment categories except for submersible).

During the test any signals radiated by equipment are measured except for antenna radiations that threaten to disturb normal operation of other ship equipment, for example, radio receiving equipment.

Test methods

The receiver with quasi-peak detector shall be used for measurements. The receiver shall have the band width of 9 kHz in frequency bands of 150 kHz to 30 MHz and 156 to 165 MHz, and the band width of 120 kHz in frequency bands of 30 to 156 MHz and 165 MHz to 2 GHz.

![Conducted radio interferences voltage limiting levels on equipment power supply terminals](image)
coefficient for antenna 51.5 dB shall be considered.

For frequencies higher than 30 MHz electromagnetic field electric component strength $E$ shall be measured. Measuring antenna shall represent dipole radiator of resonant length or, as an alternative - shortened dipole or antenna with a big amplification factor. Measuring antenna sizes towards to tested equipment shall not exceed 20% of the distance to it. On frequencies higher than 80 MHz the possibility of change of antenna's centre position height relative to ground within 1 to 4 m shall be provided.

Premise for tests shall have metal grounded surface. Premise dimensions shall allow to take measurement from the distance of 3 m.

Tested equipment shall be presented as a complete package with all connecting interdevice cables and set on normal operative position.

If tested equipment consists of several devices, connecting cables (excluding antennas power supply) between main and other devices shall be of maximum length indicated in Manufacturer's specification, or not shorter than 20 m if there is no such data. Input and output connectors shall be connected to cable, which max length is determined by manufacturer, or not shorter than 20 m if there is no such data; connectors also shall be aligned to impedance of other equipment which they usually connected to.

Cables shall be gathered in coils settled at the distance of 30 to 40 cm from connectors that they are connected to. If this is impossible, explanatory inscription shall be made in protocol.

Measuring antenna shall be located at the distance of 3 m from tested equipment. Antenna's centre shall be higher than grounded surface for at least 1.5 m. To determine maximum interference level, the antenna measuring E-field shall be adjusted for height only. Also, it shall have rotation possibility for measuring horizontal and vertical polarization. The antenna shall stay parallel to the floor. It shall be possible to displace either antenna around testing equipment to determine maximum frequencies level, or rotation of equipment mounted in orthogonal planes of measuring antenna at the level of its midpoint to achieve the same effect.

For frequency band 156 to 165 MHz it is allowed to use a receiver with peak detector or spectrum analyzer.

Limit radiation standards in the band of 150 kHz to 2 GHz, measured at a distance of 3 m from tested equipment enclosure, are specified in Fig. A15.14.2.3.

![Fig. A15.14.2.3. Limiting levels of radiated interferences from equipment enclosure connectors:](image)

$B^*$ — measuring receiver's band width

### 14.3 External electromagnetic interference stability tests

#### 14.3.1

For performance of these tests (unless other instructions are provided) tested equipment shall be submitted in its normal working package and shall operate under normal conditions.

Tests results are assessed by criteria A, B and C:

- A criteria — normal operation in accordance with established requirements;
- B criteria — temporary functional deterioration or temporary functional failure with subsequent recovery of normal operation without operator's intervention;
- C criteria — temporary functional deterioration or temporary functional failure which
requires operator’s intervention or system reboot.

Conditions and types of electromagnetic interference stability tests are shown in Table 2.7.3-2 Part VI of RCCS, where is also shown radio and navigation equipment operating quality criteria.

If radio receiver is included in equipment composition, then conducted interferences stability tests shall exclude any narrow bands of received operating frequencies on which radio receiver responds (false responses).

**Stability to conducted low frequency interferences (all equipment categories except for portable)**

14.3.2 In this test harmonic components of the voltage in AC mains supply or voltage ripples in DC mains is imitated. These tests are not applied to battery-operated equipment.

Tests on voltage harmonic components stability is performed by overlaying of additional testing sinusoidal voltage within the band of 50 Hz to 10kHz on power supply voltage. Level of sinusoidal voltage applicable actual value contains:

- 10% of supply voltage within frequency band of 50 Hz to 750 Hz;
- 10% to 1% of supply voltage within frequency band of 750 Hz to 5 kHz;
- 1% of supply voltage within frequency band of 5 kHz to 10 kHz.

Tested equipment operation control is performed during and after tests.

**Stability to conducted radio frequency interferences (all equipment categories except for portable)**

14.3.3 In this test effect of disturbances, induced in supply circuit, control circuit and circuit of signal flow from supply source starting, engine ignition systems, operating echo sounders and ship transmitters on frequencies below 80 MHz are imitated.

Tested equipment is mounted on an insulating table situated on the height of 0.1 m over the surface. Additional equipment needed for tested equipment power supply, as well as signals needed for its normal operation and functionality check, shall be connected with cables. Cables shall be provided with relevant communication devices and isolating devices, situates at a distance of 0.1 - 0.3 m from tested equipment.

Tests are performed with using generator connected through communication and isolation circuits.

Vacant input terminals of generator’s HF-signal for communication and isolation circuits are loaded with resistance of 50 Ohm. Test generator is adjusted for every communication and isolation circuit; additional equipment and tested equipment are shut off and replace with resistances of 15 Ohm each. Test generator signal level shall be adjusted so as to provide non-modulated voltage of needed level on tested equipment input terminals.

Tests are performed in cases of following test signal levels:

- active voltage value 3 V at variable frequency in the band of 150 kHz to 80 MHz (test severity level 2);
- active voltage value 10 V in points with frequencies of: 2; 3; 4; 6,2; 8,2; 12,6; 16,5; 18,8; 22; 25 MHz.

During tests amplitude modulation with frequency of 400 Hz ±10% at modulation depth of (80±10) %.

Frequency slew rate shall not exceed 1.5·10³ dec/s to give an opportunity to detect any malfunctions of tested equipment.

The above said signals are superimposed on power lines, signal lines and control lines of tested equipment. Tested equipment operation control is performed during and after tests.

**Immunity to conducted radiated radio frequency interferences (all equipment categories except for submersible)**

14.3.4 In these tests the effect of the impact of radio transmitters operated on frequencies above 80 MHz (for example, ships’ fixed and portable VHF radio transceivers) situated close to the equipment are imitated.

Tested equipment is mounted in suitable shielded room or anechoic chamber, which dimensions shall be comparable to tested
equipment dimensions. Tested equipment shall be mounted in uniform field area and be insulated from the floor by non-metal support.

If requirements to the cable type for tested equipment are not specified, then unshielded parallel conductors shall be used. These conductors expose to electromagnetic field at the distance of 1 m from tested equipment.

Tests are performed with radiating antenna arranged face towards all sides of tested equipment. If equipment can be used in various orientations (vertical and horizontal), tests shall be performed from various sides. At start tested equipment is arranged face, matching with calibration plane. Frequency variation rate shall be $1.5 \times 10^{-3}$ dec/s — for frequency band of 80 MHz to 1 GHz and $0.5 \times 10^{-3}$ dec/s — for frequency band of 1 to 2 GHz and be slow enough to allow detection of any malfunctions in tested equipment.

Tested equipment is placed in modulated electrical field of strength 10 V/m at frequency shift within the band of 80 MHz to 2 GHz. At modulation frequency of $(400 \pm 40)$ Hz modulation depth shall be $(80 \pm 10)$ %.

**Immunity to electrical fast transient from fast transient processes in AC power supply circuits (all categories of equipment except for portable)**

14.3.5 In these tests fast low-power transient process created by equipment which enabling is accompanied by arcing on contacts are imitated.

Pulsing voltage is applied to power circuits, control circuits and signals circuits with following parameters:
- rise time: 5 ns (at level 10% and 90% of amplitude);
- duration: 50 ns (at level 50% of amplitude);
- amplitude: 2 kV on AC power supply differential inputs;
- 1 kV on signal and control circuits inputs;
- type: periodic short sequences of continuity 15 ms, repeated every 300 ms;
- number of fed pulses: not less than five of positive polarity and five of negative polarity for each event of interference.

**Immunity to microsecond impulse interferences from fast transient processes in AC power supply circuits**

14.3.6 These tests shall imitate influence of high energy pulse spikes, created by thyristor switches in AC mains supply.

Tests shall be performed using combined test generator of microsecond impulse interferences, together with communication and isolation circuit.

Pulsing voltage is applied to tested equipment power circuits with following parameters:
- rise time: 1 ns (at a level of 10% and 90% of amplitude);
- duration: 50 ns (at level 50% of amplitude);
- amplitude: 1 kV line/earth, 0.5 kV line/line;
- repeat rate: 1 impulse per second;
- nature of the exposure: continuous;
- exposure duration: 5 min for every positive and negative polarity of impulses;
- number of fed pulses: not less than five of positive polarity and five of negative polarity for each event of interference.

**Immunity to short-term parameters variation in power circuit (all equipment categories except for portable)**

14.3.7 These tests imitate changes of voltage and frequency in power circuits due to big load changes. Changes are not applied to DC powered equipment.

Power circuit parameters changes shall be performed using programmable power supply.

Equipment shall stay serviceable at following power circuit parameters changes compared with rated values (tests are performed once per minute, five cycles within 10 minutes):
- voltage: increase of relative rated value by $(20 \pm 1)$ % for $(1.5 \pm 0.2)$ s;
- frequency: increase of relative rated value by $(10 \pm 0.5)$ % for $(5 \pm 0.5)$ s, with overlaying of specified parameter changes;
Appendix 15

voltage: decrease of relative rated value by $(20\pm 1)\%$ for $(1.5\pm 0.2)\ s$;
frequency: decrease of relative rated value by $(10\pm 0.5)\%$ for $(5\pm 0.5)\ s$, with overlaying of specified parameter changes.

Time of voltage and frequency rise and drop shall be $(0.2\pm 0.1)\ s$ (at amplitude level of $10$ to $90\%$).

**Immunity to power source malfunctions**

(all equipment categories except for portable)

14.3.8 These tests imitate short interruptions of ship’s power supply due to change of one power supply on another or while activating current protection. These tests are not applied to batteries-operated equipment.

Equipment shall stay serviceable after each of three power supply voltage interruptions of duration $60\ s$. Software shall not be ruined, and operation data stored in system’s digital memory shall not be lost.

**Immunity to electro-static discharge**

(all equipment categories except for submersible)

14.3.9 In these tests static electricity discharges are imitated, that can appear at human contact with equipment enclosure.

Tests shall be performed using electrostatic discharge generator (with storage reservoir of capacity $150\ pF$ and discharging resistance of $330\ Ohm$, connected to discharging generator ferrule). Tested equipment shall be mounted on an insulating plate laid over grounded metal plate. Grounded plate shall protrude beyond the equipment overall dimensions on at least $0.5\ m$ for all sides. Discharges from generator shall be applied to equipment points and surfaces that are accessible for stuff during normal operation. During tests generator shall be placed perpendicular to the surface, and points of discharges application can be chosen so that $20$ discharges per second were provided. Every position shall be subject to tests on $10$ positive and $10$ negative discharges with intervals between discharges at least $1\ s$ to provide detection of any malfunction in equipment operation. Preferred method during tests performance is contact discharge. If contact discharge can not be used (in the presence of painted surfaces), air discharge shall be applied.

For discharges imitation on items located or mounted close to tested equipment shall be performed $10$ positive and $10$ negative single contact discharges applied to grounded plate from every side of equipment. Places of discharges application shall be at a distance of $0.1\ m$ from tested equipment.

Following $10$ discharges shall be applied to the centre of vertical edges of grounded coupling plane of size $0.5\times 0.5\ m$. These tests shall be performed for every side of equipment. Vertical coupling plane shall be located so that all four front sides of equipment are fully covered.

Equipment shall stay serviceable at discharge voltage test levels of $6\ kV$ for contact discharge and $8\ kV$ for air discharge.

**15 TEST ON SOLAR RADIATION EXPOSURE**

15.1 Tests shall be performed on equipment (item) that is intended for operation on the open deck and that will fully or partly be subject to continuous exposure of solar radiation during operation.

15.2 Tests shall be performed in special chamber at air temperature in the shade of $(55\pm 2)\ ^\circ C$. Equipment shall be placed on a support and continually exposed to solar radiation imitator during $80\ h$ in accordance with Table A17.1.

Radiation intensity with regard to reflections shall be $(1120\pm 112)\ W/m^2$ for spectral distribution, stated in Table A15.15.2.

15.3 Equipment is considered to have passed the test if:

.1 no deformation, cracking, layering, buckling, ungluing of parts made of plastic or other materials have occurred;

.2 parameters and insulation resistance have remained normal;

.3 no reduction of visibility or readability of inscriptions and signs on bars or other parts of the item have been detected.
Table A15.1.5.2

Spectral distribution of solar radiation distribution with permissible spread (guides for tests on immunity to solar radiation)

<table>
<thead>
<tr>
<th>Spectral area</th>
<th>Radiation Band, μm</th>
<th>Power flow density, W/m²</th>
<th>Tolerance, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>UV B*</td>
<td>0.28-0.32</td>
<td>5</td>
<td>&lt;35</td>
</tr>
<tr>
<td>UV A</td>
<td>0.32-0.40</td>
<td>63</td>
<td>&lt;25</td>
</tr>
<tr>
<td>Visible</td>
<td>0.40-0.52</td>
<td>200</td>
<td>&lt;10</td>
</tr>
<tr>
<td></td>
<td>0.52-0.64</td>
<td>186</td>
<td>&lt;10</td>
</tr>
<tr>
<td></td>
<td>0.64-0.78</td>
<td>174</td>
<td>&lt;10</td>
</tr>
<tr>
<td>Infrared</td>
<td>0.78-3.0</td>
<td>492</td>
<td>&lt;20</td>
</tr>
</tbody>
</table>

* Radiation with wavelength less than 0.30 μm, reached the Earth surface, is negligible.

16.2 After tests equipment shall be cleared from oil, also, operation control and equipment check shall be performed. Equipment is considered to have passed the test if there are no remarks on operation check, no such damage criterion as cracking, swelling, coatings dissolution or no changes or changes in mechanical characteristics.

17.1 During the tests shall be performed series of three drops. Each drop is performed with equipment starting position different from previous position.

The height of equipment lowest point relative to water surface at the moment of dropping shall be (20±1) m.

17.2 Equipment operating check and inspection for the presence of external damages and pressurization leakage.

17.3 Equipment is considered to have passed the test if there are no remarks on operation check, external damages and pressurization leakage.
GUIDELINES FOR CABLE ITEMS TESTING ON FLAME RETARDENCE

1. Tests shall be performed for checking insulated cable on wires on flame retardence.

2. Specimens are cable or wire sections of length (600±25) mm each. Before tests specimens shall stand the temperature of (23±5) °C and relative humidity of (50±20)% for at least 16 h. If cable or wire is covered with paint or varnish, then specimen shall stand the temperature of (60±2) °C for 4 h before tests.

3. Testing chamber consists of metal crate of length (450±25) mm, width (300±25) and height (1200±25) mm without the front side. Testing chamber bottom shall be protected with mineral insulation layer. Testing chamber shall be placed in premise without draughts and with removal systems of toxic gases emitted during burning.

4. Before tests burner shall be placed on the horizontal surface so that its flame was directed straight up, and its total length shall be 125 mm, and length of inner blue flame - 40 mm. Burning operation is tested by inserting of copper wire of diameter (0.710±0.025) mm and length at least 100 mm transversely to the flame at a distance higher than end of flame inner blue part on 10 mm, so that wire length was over the nozzle edge. Flame temperature shall be so that copper wire melt not faster than in 4 s and no slower than in 6 s.

5. The specimen is attached to two horizontal bearings with copper wire (Fig. A16.5-1) so that the distance between lower edge of upper bearing and upper edge of lower bearing was (550±5) mm. The lower end of the specimen shall be situated at a distance of about 50 mm from the chamber's bottom. The burner arrangement shall be so that the blue flame inner cone end was touching the specimen surface at a distance of about 75 mm higher than lower grip; the burner nozzle axis together with specimen vertical axis shall create angle of 45° (Fig. A16.5-2). Flame inner blue part shall be located at a distance of about 10 mm from the specimen.

Fig. A16.5-1. Specimen arrangement in the testing chamber:
1 — metal chamber; 2 — bearing bar and copper wire attachment; 3 — specimen; A — distance from the chamber's bottom to lower end of the specimen (about 50 mm)
The specimen shall be continuously exposed to flame for the time specified in Table A16.6. At the end of test burner shall be removed and burner's flame extinguished.

**Table A16.6**

<table>
<thead>
<tr>
<th>Outer diameter $D$ of the specimen (mm)</th>
<th>Flame exposure time (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D \leq 25$</td>
<td>60</td>
</tr>
<tr>
<td>$25 &lt; D \leq 50$</td>
<td>120</td>
</tr>
<tr>
<td>$50 &lt; D \leq 75$</td>
<td>240</td>
</tr>
<tr>
<td>$D &lt; 75$</td>
<td>480</td>
</tr>
</tbody>
</table>

7 After the burning is fully over, the specimen shall be carefully wiped with fabric.

If the specimen surface has no damages, after the wiping presence of soot is permissible on the specimen surface. Softening or any deformation of non-metal material shall be ignored. The distance between lower edge of upper bearing and specimen carbonized part beginning shall be measured with accuracy of up to 1 mm.

Burning part beginning shall be determined as follows. Cable surface is pressed with sharp object, for example - knife blade. Place, where specimen pliant surface changed on fragile (crumbly) counts as burning part beginning.

8 A cable or wire is considered to have passed the test if the specimen does not ignite, or appeared specimen burning fades away by itself at the end of test flame exposure and traces of fire do not reach upper end of the specimen.

Besides, if burning spreads down to the point located at a distance of more than 540 mm from lower edge of upper bearing, cable or wire count as failed the test.

If the specimen failed the test, two more tests shall be performed. If after two additional tests satisfactory results were gained, cable or wire count as passed the test.
VALUES OF PARAMETERS CHECKED DURING THE TEST
ON BUILT SHIP ELECTRICAL PROPULSION SYSTEM

Parameters checked during ship electrical propulsion system testing, requirements to their values and measurement tolerances are shown in Table A17.1.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Accuracy of voltage maintenance by AC main unit automatic regulator, equal to the ratio of difference between idle voltage and voltage at rated load to sum of these voltages at load $\cos \varphi = (0.8\pm 5)%$ without changing voltage regulator setting knob</td>
<td>Tolerance 2.5%</td>
</tr>
<tr>
<td>2. Accuracy of voltage maintenance by AC emergency unit automatic regulator, equal to the ratio of difference between idle voltage and voltage at rated load to sum of these voltages at load $\cos \varphi = (0.8\pm 5)%$ without changing voltage regulator setting knob</td>
<td>Tolerance 3.5%</td>
</tr>
<tr>
<td>3. Operation of automated generator load and frequency regulation at sudden load change. Apply on generator operating in idle intermediate load containing 70% (another power level is permissible in accordance with manufacturer’s instructions, but not less than 50%) of rated generator power, then make a pause of duration at least 10 s, after that make a load rise up to 100% of rated generator power. Make a pause again of duration at least 10 s, then make a load relief down to idle. Voltage shall not deviate from rated value more than $+20, – 15%$ and shall restore to previous value within 1.5 s with deviation not more than $\pm 3%$ of rated value. Frequency shall not deviate from rated value more than $+10%$ and shall restore to previous value within 5 s with deviation not more than $\pm 5%$ of rated value.</td>
<td></td>
</tr>
<tr>
<td>4. Steady frequency oscillations (swing) of AC diesel-generator at loads from 25 to 100% of rated active power.</td>
<td>max. 1%</td>
</tr>
<tr>
<td>5. Non-uniformity of active load of generators, operated in parallel, that can be checked by watt-meters reading difference with maximum and minimum values of active power.</td>
<td>Not more than 20% from rated power of generator with greatest capacity, operating in parallel with other generators (meeting the requirements of 3.6.4, Part VI of RCCS shall be provided)</td>
</tr>
</tbody>
</table>
## Parameter

| 6. Non-uniformity of reactive load of generators, operated in parallel, that can be checked by amperemeters reading difference with maximum and minimum current rate. |
| 7. Actuating of protection against generators reverse-power (for generators intended for parallel operation) |
| 8. Stability of parallel work of all generators at generators total load about 80% of common rated power of generators, operated in parallel. |
| 9. Automatic discharge with two stages at 2 and more generators operating in parallel. For power plants, consisting of 2 diesel-generators without parallel operation mode one stage discharge is permissible (second stage is generator disabling the generator by overload protection performed by automatic circuit breaker) |
| 10. Generation startup and activation time on buses under voltage (with synchronization) with following acceptance of load of established level (80-95% of generator rated power) |
| 11. Time of startup and load acceptance by following generator in case of voltage loss on main distribution switchboard buses |
| 12. Time of startup and load acceptance of emergency diesel-generator |
| 13. Insulation resistance of networks under voltage, measured using standard megohm meter on main distribution switchboards or emergency distribution switchboards |
| 14. Nonlinear distortion factor |
| 15. Actual value of odd harmonics in networks with powerful semiconductor converters. |
| 16. Power disconnection from an external electric power source in case of overload |
| 17. Power disconnection from an external electric power source in case of phase interruption or asymmetric voltage distributions on phases |
| 18. Power disconnection from an external electric power source in case of voltage drop |
| 19. Electric motors temperature exceeding after stop under load current in comparison with temperature before beginning of the test (exceeding is defined as difference between maximum temperature of stop under load current mode end before its steady decline, and temperature before beginning of the test: steering gears with direct electrical drive — within 60 s, Anchor machinery — minimum 30 s; Mooring machinery — minimum 15 s; If there are no integrated sensors in winding, temperature can be changed directly on electric motor bed, for example, by connecting pyrometer's thermocouple. Need of tests related to that Para on the ship and their methods are approved by the River Register. |

### Value

| Not more than 20% from rated current of generator with greatest capacity, operating in parallel with other generators (meeting the requirements of 3.6.5, Part VI of RCCS shall be provided) |
| 8–15% of generator rated active power. Actuation time (generator circuit-breaker shutdown) shall be within 3-10 s. Parallel operation shall not be accompanied by exchangeable fluctuations of active or reactive power. 1-st stage: power — 100% of the rated generator power; time — 5 s. 2-nd stage at keeping 100% load, generator shutdown in 10 s. |
| max. 30 s |
| max. 20 s |
| max. 30 s |
| At least 0.06 M Ω for networks up to 100 V and 0.2 M Ω for networks up to 500 V max. 10 % max. 5 % of nominal voltage |
| At current overload over 110% One phase interruption or asymmetric voltage distributions on phases over 10% Minimum 75 % of nominal voltage |
| Maximum 30% of temperature values in normal mode (in accordance with the datasheet data) |
20. Steering gear engine initial starting torque with direct electrical drive. Need of tests related to that Para on the ship and their methods are approved by the River Register.

21. Number of starts with duration of 5 s from main or emergency diesel-generator, provided by starting system (of compressed air or accumulator starting battery)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. Steering gear engine initial starting torque with direct electrical drive. Need of tests related to that Para on the ship and their methods are approved by the River Register.</td>
<td>Minimum 200 % of nominal torque</td>
</tr>
<tr>
<td>21. Number of starts with duration of 5 s from main or emergency diesel-generator, provided by starting system (of compressed air or accumulator starting battery)</td>
<td>min. 6</td>
</tr>
</tbody>
</table>
METHOD OF ON BOARD TESTING OF SYSTEMS, EQUIPMENT AND DEVICES FOR PREVENTION OF ENVIRONMENT POLLUTION

1 General requirements

1.1 Performance checking of ecological safety equipment shall be made during the mooring and/or running tests according to the program approved by the River Register.

1.2 Testing shall be held using authorised equipment and devices. Measuring means used for tests shall be supplied with the documents testifying its periodical checking if required.

1.3 The survey units are admitted to tests provided that its assembling has been checked by the Surveyor and no remarks have been made which may obstruct the testing procedure.

2 Filtering equipment

2.1 Tests shall be carried out at the design capacity of the equipment.

2.2 Before tests equipment shall be filled with clean water until its appearance from the sampling; at that standard purge pump output is measured (in case of filtering equipment supply and installation without standard purge pump, the output of used ship pump shall not exceed rated flow capacity of equipment more than by half as much). Then oil products shall be pumped through the equipment filled with water for 5 minutes in order to pollute it by oil together with connected pipes.

2.3 On the next stage the oil-water mixture with oil concentration of 5,000 to 10,000 ppm$^{-1}$ shall be charged into the equipment until the stabilised mode is established. The mode is considered as stabilised when a volume of oil-water mixture has been pumped through the equipment which is not less than the doubled capacity of tested equipment.

The minimal rated time $t$ needed to pump the indicated quantity of oil-water mixture is calculated by the formula, in hours

$$t = 2 \left( V_s + V_f \right) / Q , \quad \text{(A18.2.3)}$$

where $V_s$ — separator (filter) volume, m$^3$;

$V_f$ — filter volume, m$^3$;

$Q$ — pump capacity, m$^3$/h.

2.4 The tests mentioned in 2.3 shall be carried out for 30 min. Samples shall be taken both at the inlet and outlet of the equipment on the 10th, 20th and 30th minutes of the stabilised mode; the last sampling at the outlet on the 30th minute shall be accompanied by air grasp by opening the cock at the pump suction and gradually closing the oil and water valves.

2.5 Sampling procedure and the analysis of the samples shall be carried out in accordance with the test program agreed with the River Register.

2.6 Oil contents in the discharge shall not exceed the admissible normative values (see Appendix 2).

2.7 In order to check the operation of oil gauge and the presence of oil in the oil collector as well as automatic drain valve sensors
pure oil products shall be pumped to tested equipment until the devices are actuated.

The checking may be performed by means of submerging sensitive elements of the gauges dismantled from the oil collector into the capacity containing pure oil products.

2.8 The following shall be checked during the tests:

1. joint tightness during operation of the equipment;
2. automatic operating mode;
3. manually controlled operating mode;
4. operation of pump units and service systems;
5. operation of automation, alarm and control means.

Checking may be carried out by means of inducing extreme parameter values directly near the system sensors.

3 Alarm device. Device for automatic interruption of oil-containing water discharge

3.1 Tests are performed on oil-containing water and clean water as per 2.2.

3.2 Performance tests shall be carried out in conjunction with tests of filtering equipment; sampling shall be made as per 2.4. The pressure in a sampling point for test conditions shall be the same as for working conditions.

3.3 Results of sample analysis shall not exceed the device error which shall be within limits of \( \pm 10\% \) of the actual oil concentration.

Readings of the alarm device for excessive oil concentration in the discharge shall comply with data of Appendix 2 of RPPS.

3.4 The following shall be tested:

1. calibration of the oil contents-measuring device according to the manufacturer instructions;
2. operation of the alarm device. It shall be actuated automatically when exceeding the given value of oil contents or by other way specified in its Registration Certificate, and send visual and audible signals simultaneously with actuation of the adjusting elements to interrupt overboard discharge. The alarm device shall be actuated automatically in the event of any malfunction of the device;
3. operation of the discharge controlling device. The overboard discharge of oil-containing water shall be interrupted if the normative value is exceeded. The discharge shall be interrupted in the event of any malfunction of the system or switching off the system;
4. availability of a local indicator of position of the system overboard valve;
5. operation of manual control of the discharge.

4 Automatic monitoring and control systems for ballast and washing water discharge

4.1 Tests are carried out in the water. The following shall be tested:

1. operation of pumps, absence of leakage in the sampling system;
2. operation of remotely controlled sampling valves;
3. the flow intensity or pressure drop whatever is used, and the adequacy of working flow parameters of the system. This test is to be carried out separately for each sampling point and checked by measuring;
4. operation of the alarm in the event of malfunctions caused by conditions external to the discharge control system, e.g. absence of the medium in the sampling system, absence of the flowmeter signal, power supply break etc.;
5. indication of adequacy of values and synchronisation of simulated (imitated) input signals by means of its manual measuring when the discharge control system operates on water. For discharge control systems of category A the evidence shall be got that the discharge control device is in operation and the data are recorded;
6. the possibility of restoration the normal operation conditions after the instantaneous intensity of the discharge has been reduced lower than 30 litres per mile;
.7 availability of recording after override to manual control. For discharge control systems of category A the evidence shall be got that the discharge control device is in operation;

.8 impossibility of overboard discharge control when the system has been switched off – for control systems of category A;

.9 position of zero point and calibration of the measuring device according to the operating manual and manufacturer’s instructions when the system is in operation;

.10 the accuracy of any installed flow-meter, e.g. by means of pumping water in closed contour where the flow rate may be calculated on the basis of the level changing in the tank. The checking is held at flow rate corresponding to 50 % of the nominal flow rate;

.11 the system actuation time from the moment of changing oil concentration in the discharge till the moment of actuation of the signal for the discharge interruption which shall not exceed 20 sec.

4.2 The following shall be tested during the tests of automatic oil measuring device in the discharge:

.1 the flow rate, pressure drop or other equivalent parameter whatever is used;

.2 incorporated alarm devices;

.3 adequacy of readings for several oil concentrations (checking method shall be approved by the River Register).

4.3 The following shall be tested during tests of the oil discharge control section:

.1 all signals;

.2 adequacy of operation of signal processing device and a recorder;

.3 actuation of the device when the oil discharge rate or the total amount of discharged oil exceeds the stated norms;

.4 actuation of signal of overboard discharge interruption in conditions when the alarm has been actuated.

5 Detectors of the oil-water phase division boundary in settling tanks

5.1 For testing purposes the tank shall be filled with oily mixture.

5.2 The following shall be tested:

.1 the accuracy of the detection of oil-water phase division boundary by means of comparison of the device readings with the position of phase boundary known or measured by any other method. The device accuracy shall provide for the indication of oil-water phase division boundary within limits of ±25 mm from the actual;

.2 actuation time of the device.

6 Pumping, delivery and discharge systems for sewage

6.1 During tests of pumping and collection systems the operation of the remote control of an oil amount in the oil-containing mixture and the level alarm in the cargo, settling and collecting tanks shall be checked. An oil amount in the oil-containing mixture may be simulated according to method agreed by the Inspection-office.

6.2 The following shall be tested during tests of the delivery system:

.1 operation of manual start and stop devices of pumping means;

.2 conditions of remote stop of pumping means from the place of the discharge observation or effective telephone or radio communication between the place of observation and the control station of pumping means;

.3 delivery of oil-containing water and oil residues from collecting tanks to reception facilities;

.4 adequate operation of visual and audible warning alarm when the upper limit level in the cargo, settling and collecting tanks is reached.

7 Sewage treatment plant

7.1 Prior to testing the sewage treatment plant in operation the availability of valid resolution of the federal sanitary supervision body shall be checked.

When the resolution in addition to tests (see 7.2 of this Appendix) is not available, the installation shall be tested for sanitary workability. The procedure of those tests shall be
determined by a representative of the federal sanitary supervision body.

The resolution of the federal sanitary supervision body shall be attached to the documents issued by the River Register.

7.2 The plant tests shall be performed on water and check:
   .1 free flow to the installation;
   .2 operation of a grinder (macerator) for solid impurities, if any;
   .3 adequate operation of pump and air-blowing units;
   .4 conditions of actuation of level sensors located in the installation chambers;
   .5 operation of batchers for flocculant (coagulant) and disinfectioning agent;
   .6 operation in manual and/or automatic operating mode;
   .7 operation of automation, alarm and control means (may be made by simulation method);
   .8 operation of electric drives and auxiliary facilities (by external examination);
   .9 operation of submersible pumps, if any;
   .10 operation of ventilation system of a separate space containing the installation, if any.

8 Sewage collecting tanks

8.1 Tests may be carried out on the outboard water.

8.2 The following shall be tested:
   .1 free flow of sewage;
   .2 the possibility of washing from the water fire main and steaming if steam-heating system is available;
   .3 draining by a pump or ejector with overboard discharge of water;
   .4 adequate operation of visual and audible warning alarm when the upper limit level in the sewage collecting tanks is reached.

9 Pumping, delivery and discharge systems for sewage

9.1 Performance tests are carried out in conjunction with the tests mentioned in 7 and 8 of the present Appendix proceeding from the contents of the ecological safety equipment installed in a ship.

9.2 The following shall be tested:
   .1 adequate operation of means for manual start-up of pumping equipment (pumps or ejectors);
   .2 delivery of sewage from collecting tanks to reception facilities.

10 Incinerators

10.1 Tests are carried out on the kinds of refuse stated in the documentation for the incinerator.

10.2 Water contents in oil residues and/or sewage slime, when the incinerator is intended for its burning, shall be not lower than listed in the documentation.

10.3 Tests are carried out at operating modes specified in the documentation for the incinerator. The sequence of modes, the period of operation at each mode and test sequence are determined by the program approved by the River Register.

10.4 During testing the following shall be checked:
   .1 adequate operation of ventilation system of a separate space containing the installation, if any;
   .2 conditions of blocking the feeding hopper lids, if any, to prevent from its simultaneous opening during loading;
   .3 conditions of blocking the fuel nozzle when it is in working position and air for burning is supplied into the furnace;
   .4 adequate operation of automatic shut-off devices for fuel supply to the burner in the event of stop of the air supply, flame failure or cut-off of electric power supply;
   .5 adequate operation of the incinerator in manual and automatic operating modes;
   .6 adequate operation of automation, alarm and control means;
   .7 condition of the space during the operation of the incinerator;
.8 absence of sparking from gas-discharging system to the ambient atmosphere.

11 Garbage treatment plants

11.1 Adequate operation of the following items shall be tested:
   .1 ventilation system of a separate space containing the installation, if any;
   .2 loading mechanisms;
   .3 grinders for refuse. The size of grinded particles shall not exceed 25 mm;
   .4 compacting devices for refuse which shall reduce its initial volume by 5;
   .5 automation, alarm and control systems.

12 Hoses designed to pump the oil and oil-containing water

12.1 Hoses included into ship supply and used for pumping oil, oil-containing or sewage water are subjected to hydraulic tests by testing pressure equal to 1.5 of work pressure.