



ANNEXES
TO THE GUIDELINES
ON TECHNICAL
SUPERVISION
OF SHIPS
IN SERVICE

The present Annexes are the part of the Guidelines on Technical Supervision of Ships in Service on conducting surveys and tests of separate items of technical supervision, on issuance of the Register documents on survey results, as the instructions for determination of technical condition, for thickness measurements, etc, as the guidelines on supervision of repairs, on determination of the composition of ship's equipment and outfit. The date of coming into force of the present Annexes is 1 January, 2019.

Following circular letters: 340-22-1071c of 13.12.2017, 340-22-1105c of 14.03.2018, 340-22-1117c of 27.03.2018, 340-22-1121c of 10.04.2018, 340-22-1158c of 06.08.2018, 340-22-1166c of 24.10.2018, 340-22-1178c of 13.12.2018;

following IMO resolutions: A.817(19), MSC.268(85), MSC.318(89), MSC.354(92), MSC.393(95), MSC.426(98);

IACS procedural requirement: PR1C (rev.5, Jan2016) have been taken into consideration.

On the entry into force of the Annexes to the Guidelines on Technical Supervision of Ships in Service (2018) become void.

The Annexes to the Guidelines on Technical Supervision of Ships in Service (2018) are intended for surveyors, ships' crews and shipowners.

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

As compared to the previous edition (2018), the present edition (2019) contains the following amendments.

ANNEX 1. PROCEDURE FOR IN-WATER SURVEY OF SHIPS AND OFFSHORE INSTALLATIONS

1. The annex has been renamed.
2. Paras 3.1.4 and 3.3.1 have been amended.
3. Editorial amendments have been made.

ANNEX 2. INSTRUCTIONS FOR CONTINUOUS SURVEY OF SHIPS

1. New paras 1.4, 8.8 have been introduced.
2. Paras 8.2 and 8.7 have been amended.
3. Editorial amendments have been made.

ANNEX 3. INSTRUCTIONS FOR USE OF RELIABLE READINGS OF INTEGRAL SYSTEMS AND PORTABLE EQUIPMENT FOR DIAGNOSTICS AND NON-DSTRUCTIVE TESTING IN SURVEY OF SHIP'S ITEMS OF SUPERVISION

1. Paras 1.7, 1.8, 1.9, 1.11, 2.6, 2.7, 3.1.4, 3.1.5, 3.1.6, 3.1.8 have been amended.
2. Editorial amendments have been made.

ANNEX 4. INSTRUCTIONS FOR SURVEY OF LIFEBOUYS AND LIFE JACKETS AT SPECIALIZED LOCATIONS INTENDED FOR SURVEY, TEST AND REPAIR OF PERSONAL LIFE-SAVING APPLIANCES

1. Paras 1.8, 9.1, 10.1 have been amended.
2. Editorial amendments have been made.

ANNEX 8. PROVISIONS OF FLOATING DOCS WITH TOW LINES FOR A SINGLE PASSAGE

1. Para 10 has been amended.
2. Editorial amendments have been made.

ANNEX12. INSTRUCTIONS FOR ISSUANCE OF THE REGISTER DOCUMENTS TO SPECIAL PURRPOSE SHIPS

1. The annex has been renamed.
2. Editorial amendments have been made.

ANNEX 13. REGULATION FOR IMPLEMENTATION FOR IMPLEMENTATION AND MAIBTENANCE OF SHAFTING CONDITION MONITORING SYSTEM

1. Para 3.3.2 has been amended.
2. Editorial amendments have been made.

ANNEX 17. IMPOSING, CLEARING AND CONTROLLING THE REGISTER REQUIREMENTS

1. Para 2.5.4 has been amended.
2. Editorial amendments have been made.

ANNEX 18. RECOMMENDATION ON CONDITIONS FOR THE APPROVAL OF SERVICING STATIONS FOR INFLATABLE LIFERAFTS

1. Para 2.16 and Appendix 1 have been amended.
2. Editorial amendments have been made.

ANNEX 23. INSTRUCTION ON VERIFICATION OF NAUTICAL CHARTS AND NAUTICAL PUBLICATIONS

1. The annex has been renamed "Annex 23. INSTRUCTIONS FOR VERIFICATION OF NAUTICAL CHARTS AND NAUTICAL PUBLICATIONS" (in English only).
2. Para .2 (at the end of the annex) has been amended.
3. Editorial amendments have been made.

ANNEX 25. SURVEY OF SHIPS CARRYING DANGEROUS GOODS IN PACKAGED FORM AND IN BULK

1. Paras 1.2.2, 2.1.11, 2.1.16, 2.1.23.3, 2.3.2.8 have been amended.
2. Editorial amendments have been made.

ANNEX 26. INSTRUCTIONS FOR SURVEY OF SHIP'S PIPING

1. Para 2.1 has been amended.
2. Existing para 4.5 has been renumbered 4.6, existing para 4.6 has been renumbered 4.5; Table 4.5 has been renumbered 4.6.
3. Paras 4.2, 4.4, 4.6 (a new number), 4.7, 5.4, 5.5, 5.6 and Table 4.6 (a new number) have been amended.
4. Appendix 3 has been deleted.
5. Appendix 4 has been renumbered 3.
6. Editorial amendments have been made.

ANNEX 27. PROCEDURE FOR CARRYING OUT SURVEYS OF SHIPS IN SERVICE ON THE INITIATIVE OF THE REGISTER (INITIATIVE SURVEY)

1. Paras 1.8, 1.12 have been amended.
2. Paras 7, 8, 10, 11, 17, 18 of Table "Equipment and outfit survey checklist" have been amended.
3. Editorial amendments have been made.

ANNEX 28. GUIDELINES FOR SAFE OCEAN TOWING

1. Para 13.1 has been amended.
2. Editorial amendments have been made.

ANNEX 31. MONTHLY REPORT OF THE SHIPS THE CLASS OF WHICH HAS BEEN/WAS SUSPENDED FOR MORE THAN 7 DAYS, CLASS REINSTATEMENT, CLASS WITHDRAWAL AND REASSIGNMENT OF CLASS

1. Annex 31 has been deleted. The annex number has been reserved.
2. Editorial amendments have been made.

ANNEX 34. GUIDELINES FOR SURVEYORS TO THE REGISTER ON SURVEY OF BOW, SIDE, STERN DOORS AND RAMPS AND INNER DOORS OF RO-RO SHIPS AND PASSENGER RO-RO SHIPS

1. The third paragraph has been amended.
2. Editorial amendments have been made.

ANNEX 35. INSTRUCTIONS FOR SURVEY OF MAIN STEERABLE PROPELLERS BASED ON TECHNICAL CONDITION MONITORING

1. Para 6.2.7 has been amended.
2. Editorial amendments have been made.

ANNEX 36. REQUIREMENTS FOR MAINTENANCE, REPAIR AND INSPECTION PLANS FOR FIRE PROTECTION SYSTEMS AND APPLIANCES, FIRE SAFETY TRAINING MANUALS, FIRE PLANS AND FIRE SAFETY OPERATIONAL BOOKLETS

1. Para 5 has been amended.
2. Editorial amendments have been made.

ANNEX 38. PROCEDURE FOR DIAGNOSING AND DETERMINING THE RESIDUAL LIFETIME OF SILICONE DAMPERS OF MARINE INTERNAL COMBUSTION ENGINES (ICE)

1. Paras 4.2.3, 5.3.9, 5.3.10 have been amended.
2. Editorial amendments have been made.

ANNEX 39. GUIDELINES FOR USE OF REMOTE INSPECTION TECHNIQUES FOR SURVEY OF SHIPS AND MARINE STRUCTURES

1. The annex has been renamed (in English only).
2. Paras 1.1 and 1.2 have been amended.
3. Editorial amendments have been made.

**ANNEX 44. ADDITIONAL REQUIREMENTS FOR SURVEY OF MODU AND FOP IN ACCORDANCE
WITH APPLICABLE CODES**

1. Para 2.2.4 has been amended.
2. Editorial amendments have been made.

**ANNEX 47. RECOMMENDATIONS TO ENSURE SEAWORTHINESS PROPERTIES AND POSING OF
RESTRICTIONS DUE TO WEATHER CONDITIONS DURING PASSAGES**

1. Para 13 has been amended.
2. Editorial amendments have been made.

**ANNEX 50. GUIDANCE ON TECHNICAL SUPERVISION OF ANCHORING EQUIPMENT IN SERVICE
(WITH DUE ACCOUNT FOR THE PROVISIONS OF IACS RECOMMENDATION NO. 79)**

1. Figure 2 has been amended.
2. Editorial amendments have been made.

**ANNEX 51. GUIDELINES FOR PILOT PROGRAMS OF EXTENDED INTERVAL BETWEEN BOTTOM
SURVEYS IN DRYDOCK**

1. Section 2. The third paragraph has been amended.
2. Editorial amendments have been made.

ANNEX 53. GUIDELINES FOR THE SURVEY OF OFFSHORE MOORING CHAIN CABLE IN USE

1. Paras 2.2.3, 5.3.2 have been amended.
2. Editorial amendments have been made.

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1. PROCEDURE FOR IN-WATER SURVEY OF SHIPS AND OFFSHORE INSTALLATIONS

1 GENERAL

1.1 Works ensuring the in-water survey of ships and other floating installations using the underwater television and photography shall be carried out by the organization having the Recognition Certificate (Form 7.1.4.2).

The survey performance is ensured by the work manager who shall follow this Procedure.

1.2 In order to participate in the survey performance in accordance with this Procedure, a shipowner designates a competent commission whose members are the representatives of the ship's officers and the shipowner.

1.3 The Surveyor to the Register carries out the survey of the underwater hull watching the picture transmitted by a television unit to the TV set screen. In this case, good visibility of the picture on the screen shall be ensured.

1.4 The survey location shall meet the following requirements:

.1 transparency of water in the water area of survey performance shall ensure good visibility of the survey item picture on the TV set screen (see 1.3);

.2 the depth under the keel shall be sufficient for thorough examination of underwater hull, sea chests, side and bottom openings, electronic navigational equipment sensors and transmitters, steering and propulsion gear;

.3 additional sources of artificial lighting having power sufficient for a thorough inspection of the survey item and for receiving a sharp picture on the TV set screen shall be used in inadequately lit locations.

1.5 As a basis for the scope of the underwater hull survey, the scope of the ship's dock survey provided in the Rules for the Classification Surveys of Ships shall be adopted.

1.6 The amount of documentation to be stored in the Register Branch Office at the place of ship's registration (photographs, shell expansion drawings with indication of residual thicknesses, charts of measurement of screw-rudder system clearances, etc.) is determined in each case by the Branch Office of the Russian Maritime Register of Shipping¹.

1.7 The necessary documentation, equipment, auxiliary ships, tools and devices for survey performance are provided by the organization.

2 SHIP'S PREPARATION FOR SURVEY

2.1 Prior to a survey, it is recommended to clear cargo holds and tanks of a cargo. The scope of submitting of hull structures in accessible places from the inside is determined by the Surveyor.

2.2 As to the items subject to survey, the following shall be submitted:

the final technical documentation;

the results of the previous surveys;

information on defects and damages since the latest survey;

report on the preliminary diving examination.

2.3 The shell plating of the underwater hull, screw-rudder system, inlet water boxes gratings, etc. are cleared of fouling, dirt and rust using a special cleaning unit fit for an underwater operation.

¹ Hereinafter referred to as the Register or RS.

2.4 The rope guard of the seal of a propulsion shaft cone is dismantled, inlet water boxes gratings and manholes of rudder pintle recesses are removed.

2.5 Tools and devices for measurements as well as the means of additional lighting for inspection of poorly lit places are prepared.

2.6 The ship to be surveyed is brought up to an anchor (buoys) in a specially allocated place.

2.7 Prior to a survey, the check test of adjustment of the underwater television unit, of the two-way communication with specialized divers and of preparation of photographic equipment is conducted.

The work manager in the presence of the Surveyor and commission members instructs specialized divers on the procedure for the examination of underwater hull according to the work program.

2.8 The survey is conducted according to a work program (see 9.1.11, Part II "Carrying out Classification Survey of Ships" of the Guidelines on Technical Supervision of Ships in Service²). If defects not specified in a technical substantiation are detected (see 9.1.9, Part II "Carrying out Classification Survey of Ships" of the Guidelines) during the survey, the Surveyor has a right to demand performing of a more detailed survey of items than provided by the work program including the submitting of a ship for a dock survey.

3 SURVEY

3.1 Hull survey.

3.1.1 The main means for determination of the technical condition of the underwater hull is an underwater television unit installed onboard an auxiliary ship.

3.1.2 The survey is carried out across the strakes of shell plates in a way suitable and expedient for any particular type of ship.

It is recommended to conduct the survey over the vertical zones bounded by plumbs.

The picture of sections being examined is transmitted to the TV set screen.

3.1.3 Particular attention is paid to the examination of shell plates and welds in way of a stem, sternpost, and hull from light to deep line and at the cutouts in hull plating.

3.1.4 If defects are identified, their coordinates and also measures of their extent, the bending deflection in deformation and the depth of a corrosive attack shall be measured, marked on the shell expansions and estimated against the requirements of the Rules. These data shall be submitted to the RS surveyor by the firm who carries out the in-water survey. When ROV is used, the procedure of measuring residual deformation, pitting corrosion, etc., with the use of it shall be approved by the Register beforehand.

3.1.5 By order of the work manager, the photography of inspection items from various positions is carried out (a colour film is preferable).

3.2 Survey of screw-rudder system.

3.2.1 In survey of rudder and steering gear the technical condition of rudder nozzles and stationery nozzles, a rudder blade, rudder/stock coupling, rudder trunk, bearings of the steering arrangement is checked.

3.2.2 Clearances in rudder stock bearings, between rudder pintles and gudgeons, as well as the margin for the jump clearance of the rudder blade are determined by means of feelers and a steel rule. Where it is not possible to measure bearing clearance and the Surveyor has doubts as to reliability of the above components, he may require that the rudder stock be raised to height sufficient to make measurements and examinations.

3.2.3 The results of inspections and measurements are entered in the steering arrangement file. The file is drawn by the work manager and submitted to the Surveyor.

3.2.4 In survey of a screw, the condition of blades and a boss, the presence of parts for blades, stern bush, etc. attachment are checked.

² Hereinafter referred to as the Guidelines.

3.2.5 Clearances in a sterntube bearing are measured.

3.2.6 The results of inspections and measurements are entered in the propulsion unit file. The file is drawn by a work manager and submitted to the Surveyor.

3.3 Underwater thickness measurements on ships.

3.3.1 Underwater thickness measurements shall be carried out by the firm having the Recognition Certificate for performing the activity related to "Underwater thickness measurements of ships and offshore installations under supervision of RS surveyor" (code 22022000), at that divers/ROV operators performing thickness measurements shall be certified in accordance with the recognized national or international standard (e.g., ISO 9712) and have appropriate qualification. When ROV is used, the procedure for thickness measurement with the use of it shall be approved by the Register beforehand. It is also allowed to perform thickness measurements of underwater hull of the ship afloat in accessible locations from the inside. At that the firm shall also have the Recognition Certificate for performing the activity related to "Thickness measurements of ships and offshore installations under supervision of RS Surveyor" (category 1 (code 22001001) or category 2 (22001002)) depending on the type and gross tonnage of the ship or offshore installation under survey.

3.3.2 Underwater thickness measurements of ship's shell plating and hull items, rudder plating etc. shall be carried out by the special-purpose instruments for underwater operation. Instruments for underwater thickness measurement shall at least enable:

- metal thickness measurement without preliminary preparation of the surface and removal of protective coating;

- option to use the equipment together with the data display and storage unit onboard the ship such as digital repeater or personal computer with software.

The thickness gauge data shall be transmitted to the ship through connecting cable and displayed on a digital repeater or a personal computer to facilitate monitoring of thickness measurements by the RS surveyor.

The location and number of residual thickness measurements shall be selected in accordance with Appendix 4 to the Rules. The results of thickness measurements shall be recorded in the report prepared in accordance with Appendices 2 and 4 to the Rules. It is allowed to submit to the RS surveyor the results of measurements recorded in the report on ship's underwater part examination (refer to para 9.1.8.4, Part II "Carrying out Classification Surveys of the Ships" of the Guideline) before submitting a final thickness measurements report.

3.3.3 For ships for which survey of the outside of the ship's bottom in dry dock is an integral part of special survey, the underwater thickness measurements of the outside of the ship's bottom with the ship afloat carried out not earlier than 15 months before the actual completion date of special survey, may be credited for special survey on condition that control thickness measurements will be performed at docking survey during this special survey.

4 MINOR REPAIR OF UNDERWATER HULL AFLOAT

4.1 The defects found in survey may be rectified afloat on agreement with the Surveyor.

4.2 It is allowed to perform the following minor repair works afloat:

- removal of worn-out and mounting of new protectors;
- replacement of stern tube stuffing boxes;
- elimination of minor damages of a screw (dents, barbs, etc.);
- cutting-off of damaged sections of bilge keels and their partial repair;
- backing run of separate faulty welds;
- rebuilding of the attachment of rotary and retractable devices of sonar systems and repair of their domes;
- repair of the rudder blade attachment;
- repair of inlet water boxes gratings;

installation and welding of rope guard.

4.3 The equipment used for an underwater repair (for electric welding, oxygen-arc cutting) shall be serviceable, reliable in operation and to ensure quality in work performance.

5 USE OF TV AND PHOTOGRAPHIC EQUIPMENT, TOOLS AND DEVICES

5.1 Equipment for survey performance (TV and photographic equipment, instruments for measurements of residual thicknesses of shell plates) shall be serviceable, reliable and suitable for underwater use.

5.2 Tools and devices needed for measurements shall be fit for underwater use and to ensure the error of measurements within ± 5 per cent as compared with those made with the underwater hull bared.

5.3 Equipment, tools and devices used for the survey shall be periodically checked and adjusted by competent authorities.

5.4 During examination of the outside of the ship's bottom, the sections being examined are displayed on the screen of the underwater TV unit whose video camera is directed by the specialized diver or ROV, following the instructions of the work manager/ROV operator team, onto the areas of interest for the Surveyor and members of the commission.

5.5 The photography (by digital camera preferably) of individual sections of the underwater hull in the areas examined is performed on the Surveyor or commission members' demand. The photographs are submitted to the Surveyor and commission members.

5.6 A shipowner may in good time (e.g. during hull cleaning) perform the video recording of the underwater hull and ship's arrangements in accordance with the work program for the subsequent producing of the recording to the Surveyor and commission. In this case the Surveyor is entitled to demand the performance of the check photography of those or other hull items and ship's arrangements to verify the identity of the video recording to the survey item.

6 HEALTH AND SAFETY

6.1 The in-water survey shall be carried out in accordance with the Uniform Health and Safety Regulations in Diving Work.

6.2 The work manager is responsible for observance of the Uniform Health and Safety Regulations in Diving Work.

6.3 The Surveyor is not allowed to directly lead the operations of specialized divers, as well as to switch on, switch off or adjust equipment. These works shall be carried out by the special personnel of the organization at the command of the work manager only.

2. INSTRUCTIONS FOR CONTINUOUS SURVEY OF SHIPS

1 GENERAL

1.1 These Instructions are applied by the Register while implementing and carrying out the continuous survey system for ships in accordance with 2.6 of Part II "Survey Schedule and Scope" of the Rules for the Classification Surveys of Ships in Service¹.

1.2 The items and scope of surveys according to the continuous survey system, as well as the dates of ship's submission for the items survey within the period between special surveys are planned by the shipowner with due regard for the requirements of the Rules and these Instructions.

1.3 In order to implement the continuous survey system, a shipowner is to submit to the Branch Office supervising construction of the ship or carrying out an initial (special) survey suggestions for agreement with the Register and including into the Continuous Survey List, which are to contain the nomenclature of items of supervision according to the continuous survey system and the planned dates of their submission to the Register. Following approval, the Continuous Survey List (Form 3.1.6) is issued to the ship as the appendix to the Classification Certificate. One copy is returned to the shipowner and another is sent to the RS Branch Office for in-service supervision.

1.4 To confirm by the Register the possibility for the Chief Engineer to carry out survey of items specified in the Continuous Survey List, a shipowner/company shall submit in advance to the RS Branch Office for in-service supervision the information (experience/qualifications) on the chief engineer assigned to the ship with the confirmation that the chief engineer has been authorized by the shipowner/company to perform the surveys of items specified in the Continuous Survey List (refer to 8.2). Upon results of application review, the RS Branch Office for in-service supervision shall send the Letter of Authorization of the chief engineer to Perform Surveys of Items Specified in the Continuous Survey List (hereinafter referred to as "the Letter of Authorization") (refer to 8.2) to the shipowner/company. A copy of the Letter of Authorization shall be sent to RHO for registration.

1.5 It is appropriate to combine the dates of survey according to the continuous survey system together with the prescribed periodical surveys, planned repairs and dockings, as well as with putting a ship out of service for maintenance and due to other reasons. In order to submit the items, openings-up, measurements and checks, associated with maintenance performance or planned repair, may be used.

1.6 The dates specified in the Continuous Survey List for items submission may be changed on agreement with the Register within the 5 year period since the previous survey of the same type.

The early presentation of an item (within 15 months prior to a planned date) does not need a preliminary agreement with the Register.

On agreement with the Register, additional items or alteration of the established nature and scope of the item survey may be entered in the Continuous Survey List within the current period of a continuous survey.

1.7 When a ship is submitted for a special survey prior to the end of the continuous survey period, the part of planned surveys remaining unfulfilled is carried out in the ship's special survey or may be postponed to the subsequent period with due regard for the ultimate 5 year time from the previous survey.

1.8 Putting of an item out of service for submission according to the continuous survey system, in order to ensure the safety of navigation, safety of human life, the safe carriage of goods, is carried out when the ship is put out of service, when the adequate redundancy of the item for the ship in service is provided, or when the operation and condition of the item do not effect the safety of navigation, the safety of human life and the safe carriage of goods.

¹ Hereinafter referred to as the Rules.

1.9 The surveys of items by the ship's chief engineer according to the continuous survey system are carried out in accordance with Section 8.

2 ITEMS AND SCOPE OF SURVEYS

2.1 Scope of survey of the items of the Continuous Survey List shall comply with the scope given in the Rules for the Classification Surveys of Ships in Service.

2.2 As the main purpose of continuous survey system implementation is reduction of the scope of the ship's special survey for class renewal and, accordingly, reduction of the scope of works associated with surveys and tests, and of the time to put of a ship out of service, such item surveys which essentially affect the ship's special survey scope and may be carried out during the ship's service are included into the continuous survey system.

Among such surveys are:

internal examinations and tightness tests of tanks and cargo tanks;

residual thickness measurements of hull structures;

detailed inspections and measurements associated with disassembly, opening-up and dismantling of machinery, arrangements and equipment.

2.3 As the continuous survey system applies only to items relating to the ship's or refrigerating plant class, it does not include items being part of life-saving appliances and signal means, navigational equipment, radio equipment and cargo handling gear.

The continuous survey system does not include item surveys provided in the same scope in ship's special and annual surveys, as well as the types of surveys to be carried out in the periods longer or shorter than the ones between special surveys like the surveys of propeller shafts and propellers, hydraulic tests of steam boilers, heat exchangers and pressure vessels, steam and air piping, the latter, to suit the shipowner, may be planned in the Continuous Survey List (see also 3.5).

The tests like the sea trials of main machinery, propellers shafts and steering gear carrying the special survey to completion are not included in the continuous survey system.

3 DISTRIBUTION OF SURVEY SCOPE

3.1 The distribution of the survey scope for the set period (see. 2.6 of Part II "Survey Schedule and Scope" of the Rules) is noted in the Continuous Survey List. The distribution of surveys over the period is, as practicable, to be uniform.

3.2 The intervals between sequential item surveys of the same type shall not exceed 5 years when setting the date of a survey for the continuous survey period, if the date of the actual submission of the item has been completed within 3 months prior and after the specified date.

3.3 Planning to combine ship's presentations according to the continuous survey system with the other types of ship's surveys (see 1.4), it is to be taken into account that some items of supervision relating to the ship's class are also the items of surveys according to international conventions (e.g. items of fire protection, electrical equipment, closures of ship's hull openings, etc.). In this connection it is appropriate to combine such surveys.

3.4 The item surveys unfulfilled in the previous period due to ship's submission for a special survey before the end of the continuous survey period (see 1.6) may be distributed over the planned period.

The item surveys according to the periodical survey system postponed during the ship's special survey, and the planned early surveys of items may also be included (without inclusion in the continuous survey system) in the Continuous Survey List.

3.5 The Continuous Survey List may also include the item surveys to be performed in the periods longer or shorter than the ones between special surveys (see 2.3). However, in this case, the period between sequential item surveys of the same type is not to exceed the period prescribed by the continuous survey system.

4 CONTINUOUS SURVEY LIST

4.1 Continuous Survey List shall contain the list of items of technical supervision and submission dates planned.

4.2 The Continuous Survey List submitted by a shipowner (see 1.3) is compiled individually for the items of the hull (including ship's arrangements and equipment, and structural fire protection), machinery installation (including fire-fighting equipment and systems, electrical equipment, automation and inert gas plant equipment), refrigerating plant (including the insulation of refrigerated spaces) on Form 3.1.6 and, following the approval, is issued by the RS Branch Office performing the survey to the ship along with the Classification Certificate to which it is attached.

4.3 The Continuous Survey List is developed by a shipowner proceeding from the requirements of the Rules and these Instructions. Planning surveys distribution over the set period of the continuous survey (see 3.1), it is necessary to proceed from the condition that the period between adjacent item surveys of the same type is not to exceed 5 years (see 3.2), and the surveys are to be distributed over the period as uniformly as practical. Accordingly, setting dates of the planned period, the date of an actual item presentation as per the Continuous Survey List in the previous period is to be taken into account.

4.4 When the item surveys unfulfilled in the previous period (see 3.4) are included in the Continuous Survey List, the date of an actual previous item submission for the survey of the same type, from which a limiting period is counted off, is specified in column 3 of the Continuous Survey List.

4.5 When the surveys carried out in periods which are longer or shorter than those between the special surveys (see 3.5) are included in the Continuous Survey List, the limiting period between the follow-up surveys of the same type is to be specified in column 6 of the Continuous Survey List.

5 CONTINUOUS SURVEY OF HULL

5.1 The main types of hull structures surveys included in the continuous survey system are:

examination of the underwater hull;

examination of the above-water part of the hull;

examination of hull structures from the inside of spaces removing the insulation if necessary;

internal examinations and tightness tests of tanks and cargo tanks;

residual thickness measurements of hull members.

5.2 The main types of arrangements surveys are:

examination and tightness tests of hatch covers and side ports;

examination of a steering gear and measurements of bearings clearance and jump clearance of a rudder blade;

examination of anchors and chain cables with wears measurements.

5.3 As applied to fire protection, the structural fire protection only is subject to the continuous survey.

5.4 Performance of surveys associated with ship's dockings, e.g. examinations and measurements of thicknesses in the underwater hull, tightness tests of tanks and cargo tanks, surveys of a rudder and bottom and side valves, is generally to be planned in times of ship's dockings set by the periodical survey system in the ship's annual surveys.

5.5 Planning the surveys of hatch covers and fire protection, the expediency of their combining with the surveys provided in international conventions is to be taken into account (see also 3.3).

5.6 Distributing the survey scope, it is to be considered provided in these Rules the necessity to combine certain kinds of surveys, in particular:

tightness tests of tanks and cargo tanks are generally to follow their internal examination;

prior to residual thickness measurements of structural members, the hull examination to specify places and the extent of the necessary measurements is to be carried out.

6 CONTINUOUS SURVEY OF MACHINERY INSTALLATION

6.1 The main types of machinery installation item survey included in the continuous survey system are:

- survey of engines and machinery parts in disassembled (opened up) condition including measurements of wear, clearances, insulation resistance, etc.;
- survey of electrical equipment with measurements;
- survey of automation equipment with measurements;
- survey of ship's systems and piping, of machinery installation systems and piping.

At the shipowner's request and based on seaworthy manner and the manufacturers' instructions, survey of some items may be divided into several surveys of particular components being part of this item.

6.2 Survey of propeller shafts and propellers, hydraulic tests of steam boilers, heat exchangers and pressure vessels, steam and air piping not usually included in the continuous survey system (refer to 2.3) may be included in the Continuous Survey List with the planned date of the survey as per the periodical survey system (refer to 3.5).

6.3 Setting dates for items submission, the dates and operating time prior to the prescribed inspections as per the manufacturer's data are to be considered where necessary.

6.4 The survey of a disassembled (opened up) item does not generally provide for its mandatory check in operation after assembly, but, if needed, the Surveyor may demand the check in operation to a certain extent.

7 CONTINUOUS SURVEY OF REFRIGERATING PLANT

7.1 The main types of refrigerating plant item surveys included in the continuous survey system are the surveys of:

- parts of compressors, drive motors and pumps in the disassembled (opened up) condition including measurements (of wears, clearances, insulation resistance, etc.);
- heat exchangers and other apparatus, and refrigerant pressure vessels;
- valves and piping of a refrigerant, secondary refrigerant and cooling water;
- water screen systems in the refrigerating machinery spaces;
- fans of air coolers;
- freezing and cooling apparatus;
- ventilation of the refrigerating machinery spaces and refrigerant storerooms;
- refrigerating plant automation equipment;
- insulation of refrigerated spaces, closures of hatches and doors.

7.2 Setting dates for items submission, the dates and operating time prior to prescribed inspections as per the manufacturer's data are to be considered where necessary.

7.3 The survey of a disassembled (opened up) item does not generally provide for its mandatory check in operation after assembly, but, if needed, the Surveyor may demand the check in operation to a certain extent.

8 CHIEF ENGINEER'S SURVEY

8.1 On agreement with the Register, some types of surveys of machinery and refrigerating plants items carried out by the ship's chief engineer may be taken as a continuous survey.

8.2 For authorization of the chief engineer to perform surveys in accordance with the Continuous Survey List the shipowner/company shall provide the Register with the information relating to chief engineers planned to work on board the ship and authorized to carry out continuous survey of ships of the

company, namely: information on work experience, chief engineer qualifications (availability of the appropriate certificate of chief engineer), and the written confirmation that the shipowner/company authorizes the chief engineer to carry out surveys of the items according to the Continuous Survey List. On the basis of the data submitted by the shipowner the Register issues the Letter of Authorization for each of the chief engineers to perform surveys of items specified in the Continuous Survey List. The Letter of Authorization shall contain at least the following information:

full name of the Chief Engineer;

date of birth;

number and date of issue of the certificate of chief engineer;

name(s) of the company or group of companies - owners of the ships where the surveys are planned to be carried out;

the words: "This is to confirm that the Russian Maritime Register of Shipping in accordance with the provisions of 2.6, Part II "Surveys Schedule and Scope" of the Rules for the Classification Surveys of Ships in Service and Annex 2 of the Annexes to the Guidelines on Technical Supervision of Ships in Service authorizes the chief engineer [Full name] to perform surveys of items of machinery installation and refrigerating plant indicated in the Continuous Survey List on ships of the company (group of companies ...) [it is recommended to specify the name of the ship(s) and the RS number(s)].

8.3 The item surveys carried out by the ship's chief engineer in the ports not covered by the Register services or in a voyage (when it is feasible without any damage to ship and people's safety) may be taken as a continuous survey provided that those items will be submitted to the Surveyor for the confirming survey as soon as possible but not later than within 3 months after the planned date of the survey according to the Continuous Survey List.

8.4 The scope of a confirming survey is established by the Surveyor proceeding from the specific conditions of the survey. In this case, the repeat opening-up (disassembly) of a supervision item in a scope as needed may be required, if the surveyor doubts whether the Chief Engineer has performed the survey of the item in the full scope prescribed by the RS Rules.

8.5 The items, survey of which is carried out by the chief engineer in accordance with the Continuous Survey List are established by a shipowner on agreement with the RS Branch Office performing the survey. The items of the chief engineer's surveys are usually those, which shall be opened up, examined and subjected to measurements in service according to the established practice and maintenance plan.

8.6 The survey of the following items shall not be allowed for execution by the chief engineer:

main and auxiliary boilers;

pressure vessels; transmissions;

shafting with bearings and propellers;

main and auxiliary turbines;

inert gas plants.

8.7 Every survey executed by the chief engineer shall be recorded in the Ship's Engine Log Book, and the survey results shall be entered in the appropriate Equipment Performance Log of the ship's technical appliances and, if possible, substantiated with photos. The Report signed by the chief engineer shall be submitted to the Surveyor conducting a confirming survey. This Report shall specify the item and its location, condition during the survey (disassembly, opening-up), the technical condition of parts examined, the results of measurements (of wear, clearances, insulation resistance, non-destructive testing, etc. with their maximum permissible values), replacement of parts and their repair. The Report of the chief engineer shall be accompanied by a copy of the Letter of Authorization of the Chief Engineer who has performed the survey.

8.8 The shipowner/company shall determine the possibility of performing the survey of items specified in the Continuous Survey List and bears full responsibility for the qualifications of the chief engineer authorized to perform the continuous survey. The Register may cancel the Letter of Authorization, the Continuous Survey List or perform an additional survey of the items specified in the Continuous Survey List, in case the actual technical condition of the items differs from that indicated in the Report signed by the Chief Engineer.

9 DOCUMENTS

9.1 The main document in application of the continuous survey system is the Continuous Survey List (see Section 4) used for checking the timely submission of items and for notes verifying surveys performance.

9.2 The results of the items survey according to the continuous survey system shall be recorded in the Report on Survey of the Ship (Form 6.3.10) with a note "Continuous Survey" or in the Check-list of STORM software (Form 6.1.01) when this survey is combined with the periodical survey of the ship.

9.3 The results of item surveys not included in the continuous survey system, but included in the Continuous Survey List (see 3.4 and 3.5) are specified in the Reports separately.

9.4 Conducting the confirming survey of items previously surveyed by the ship's chief engineer (see Section 8) or the documents of periodical survey, the Report of the chief engineer is attached to the Report (Form 6.3.10) of Surveyor to the Register.

10 RECORD OF ITEM SURVEYS

10.1 Control and record of item surveys according to the continuous survey system is carried out by the RS Branch Office for in-service supervision during verification of the Ship's Survey Status and records based on survey results. Remarks on performance of the continuous survey of the ship's items in the original of the Continuous Survey List on board and the Continuous Survey List in the Ship's Survey Status shall be introduced by the RS Branch Office having performed the survey mentioned

3. INSTRUCTIONS FOR USE OF RELIABLE READINGS OF INTEGRAL SYSTEMS AND PORTABLE EQUIPMENT FOR DIAGNOSTICS AND NON-DESTRUCTIVE TESTING IN SURVEY OF SHIP'S ITEMS OF SUPERVISION

1 GENERAL

1.1 These Instructions are applied by the Register in surveys without dismantling of items of supervision in use of reliable readings of integral systems and portable equipment for diagnostics and non-destructive testing when a shipowner implements on his ships the systems of maintenance and repair "as to the condition".

1.2 Surveys without dismantling are carried out using methods and equipment for diagnostics and non-destructive testing agreed with the Register.

1.3 A survey without dismantling means a conclusion on the technical condition of items of supervision on the basis of data obtained with use of equipment for diagnostics and non-destructive testing. In this case, the technical condition is assessed with due regard for the results of measurements carried out during dismantling and maintenance between surveys, as well as in view of the data of items diagnosis after ship's construction.

1.4 A survey without dismantling is carried out provided that a shipowner effects the regular check of the technical condition of items of supervision using equipment for diagnostics including the comparisons of measurement results recorded during dismantling of items, maintenance and the previous survey, as well as of the data of non-destructive testing to be noted in the appropriate documents (logs, technical condition inspection cards or equipment performance logs on a computer).

1.5 Determination of the technical condition of items of supervision using dismantling-free techniques is carried out with use of the standards of testing parameters (vibration standards, impact momentum standards, etc.) corresponding to certain types of defects, damages and functioning disturbance specified in the normative documents of shipowners agreed with the Register.

1.6 Integral testing systems and their components are to meet the requirements for ship's automation systems and are to have the Register approval.

The integral diagnostics systems fitted on the ships are subject to supervision as to:
check for functioning;

impact of those systems operation on functioning of the Register-supervised equipment, namely: malfunctions in the operation of a diagnostics system are not to affect adversely the functioning of supervised equipment;

selection of cable cross-sections;

means of protection, insulation and earthing.

The reliability of parameter readings for a working process in cylinders of the main engine with integral testing systems is to be confirmed by the readings of parameters obtained by the indicating of the working process.

1.7 Portable equipment for diagnostics after their testing in ship's conditions for reliability of readings as compared with the actual technical condition of dismantled items may be used on ships provided they are certified and periodically checked by the metrology calibration authorized service.

1.8 Annual, occasional (not associated with accidents and damages) and continuous surveys and consideration of materials of the pre-repair fault detection of items of the Register supervision may be conducted by Surveyors to the Register without dismantling using the readings of testing systems and equipment on the basis of results of measurements confirming the satisfactory technical condition of the items and their compliance with the RS requirements submitted by the shipowner.

In this case, the reliability of readings of integral systems and portable for diagnostics in use is to be previously confirmed in conducting comparative check surveys with the opening-up of presented items on ships witnessed by Surveyors to the Register.

1.9 In order to use the testing results in conducting the special survey of accessible item parts, the initial values of diagnostics parameters confirming the satisfactory technical condition of the items and their compliance with the RS requirements, as well as and the alteration of the above parameters with time are to be available.

The parts of items whose defects, on Surveyor's to the Register discretion, can not be identified by the systems and equipment for diagnostics and non-destructive testing in use are to be presented for a special survey dismantled.

The list of items that may be covered by a survey without dismantling is given in Section 5.

1.10 The testing results for a survey without dismantling may be taken into account if the previous testing was conducted at least two times with an interval of 6 to 12 months and it testified the absence of a trend to the alteration of testing parameters and to the achievement of a limiting value within the following four years of operation. In this case, a forecasting technique like a linear extrapolation is used.

1.11 It is allowed to substitute in succession only one special survey with dismantling for a survey without dismantling following all the requirements given in these Instructions.

1.12 The survey of casually-used items of supervision, whose operating time by the time of their submission to the survey does not reach the time needed for dismantling according to the manufacturer's recommendations, is to be carried out proceeding from the testing results (using dismantling-free techniques) meeting a proper technical condition.

1.13 The surveys without dismantling do not cover special and continuous surveys of ships over 15 years old except items of supervision replaced in service.

1.14 During special and continuous surveys the following machinery and its components are to be submitted to the Surveyor dismantled: pistons of main and auxiliary engines and compressors; covers; cylinder liners; head, crankpin and main bearings; connecting rods; rotors and bearings of main and auxiliary turbines; reduction gears; shaft and other couplings; steering gear; stern tubes and other items provided in the maintenance schedule for every ship.

2 ITEMS AND SCOPE OF SURVEYS AND THEIR RESULTS

2.1 Items and the scope of surveys without dismantling as to the condition using integral systems and portable equipment for testing, as well as the dates between the surveys of items are planned by a shipowner in schedules to be approved by the RS Branch Office for in-service supervision for every ship.

2.2 As the maintenance as to the condition with use of integral systems and portable equipment for testing cannot be applied to all the items of the Register supervision, shipowners are specifically to enter in schedules the items submitted up to timetable (dismantling in special surveys or in continuous surveys), and the items or their parts to be surveyed with use of integral systems or portable equipment for testing.

2.3 The items of supervision of poor manufacturing quality and operation reliability (as reported by the RS Branch Office for in-service supervision, shipowner's base organizations and services) are to be submitted to the Surveyor to the Register during special surveys dismantled what is to be specified in maintenance schedules for every ship.

2.4 The results of testing and record keeping of technical condition are to be noted in ship's documentation (logs, technical condition cards for every item of supervision); every card is to contain measured and ultimate values of parameters, as well as their alteration with time. The testing results are to be signed by a responsible person who conducted measurements, and by the ship's chief engineer.

2.5 Prior to the submission to the survey of ship's items as to their condition using integral systems and portable equipment for testing, a shipowner is to submit the results of measurements of previously conducted comparative inspections and convergence of the measurement results to Surveyor to the Register.

2.6 A shipowner is to present items of supervision for a periodical survey in a proper technical condition. The measurement results are not to exceed permissible parameters.

2.7 The items of technical supervision and their components having, as the results of testing, the unsatisfactory, and also satisfactory condition, but whose parameters are close to the limiting value, and also have a trend to the worse technical condition shall be opened up, submitted to inspection to Surveyor to the Register and checked by measurements after repair.

2.8 When the Surveyor doubts the reliability of technical condition assessment according to the readings of testing equipment or inadmissible deviations from working parameters are available, as well as when any defects of items are detected, the Surveyor may demand the survey of the item dismantled.

2.9 Following a survey without dismantling, an item of technical supervision shall be checked in operation for its designated purpose by the Surveyor.

2.10 Surveys without dismantling shall be carried out in accordance with guidance documents approved by the Register and according to methodical materials therein. The developer shall inform the Register of all the changes and corrections of the above documents and procedures for use of testing systems and equipment in surveys of items of technical supervision.

3 CONDITIONS OF SURVEYS PERFORMANCE

3.1 Item surveys performance using readings of integral systems and portable equipment for testing on ships in service is to be effected with due regard for the conditions listed in 3.1.1 to 3.1.11.

3.1.1 The application (request) of a shipowner addressed to the Surveyor to the Register for survey performance with use of integral systems and portable equipment for testing is needed.

3.1.2 The reliability of measurements obtained with use of integral systems and portable equipment for testing is to be confirmed by indicating of the working process of diesels or by the actual condition of items on opening-up when conducting comparative surveys of ships witnessed by the Surveyor to the Register.

3.1.3 Guidance documents and procedures for use of systems and equipment for testing approved by the Register are to be available on board the ship and at the responsible person entrusted by a shipowner with measurements performance.

3.1.4 Testing for the survey without dismantling is to be carried out by the locations of a shipowner and their base organizations recognized by the Register. Responsibility for the reliability of the measurement results and the timely performance of item surveys using testing systems and equipment rests with the shipowner.

According to the request of the shipowner or his base organization, the Register Branch Office where the ship is registered conducts the survey of a manufacturer (laboratory, location). In survey of manufacturers, the Surveyor to the Register is to verify that:

- pertinent portable testing equipment passing certification, state and departmental inspections, as well as non-destructive testing means are available;

- reliability of readings of every portable equipment for diagnostics and non-destructive testing, as well as of the testing system in use is confirmed during check comparative surveys with the opening-up of items witnessed by the Surveyor to the Register;

- a shipowner has designated the specialists who have a permit to conduct testing and fault detection of the ship's items;

- the specialists conducting testing have undergone special training and have the relevant certificates;

- guidance documents and the procedures to be observed during items testing are approved by the Register and available in the shipowner's laboratory (location);

- pertinent documentation for recording the testing results is available;

- regulations on the laboratory (location) of testing and fault detection, in which the procedure for and organization of conducting testing and surveys of items are specified, are approved by the Register Branch Office where the ship is registered;

justification of a positive experience and the number of measurements on ships made by every specialist of the laboratory (location) of a shipowner or base organization is available.

The Register Branch Office where the ship is registered directly determines a need for the Surveyor to the Register to participate in testing and fault detection of items of supervision on ships by the laboratory's (location's) specialists. The Surveyor to the Register is to record the results of the facility survey in the Report on Inspection of Manufacturer/Laboratory (Form 6.3.19) specifying responsible persons who will conduct testing and fault detection of items of supervision.

The Certificate of Firm Conformity (Form 7.1.27) may be issued to the laboratories (locations) of shipowners and their base organizations designated for testing and fault detection of items of supervision on ships given the positive results of surveys.

3.1.5 The responsible person (specialist of the laboratory/location of a shipowner and his base organization or the ship's chief engineer) conducting ship's item testing is to have an appropriate document an appropriate document certifying the rights for measurements using equipment for diagnostics and non-destructive testing.

3.1.6 By the submission of shipowners to the Register Branch Office where the ship is registered, the chief engineer having a relevant document confirming the authority to test items may be taken on as the Register non-exclusive Surveyor on the ship prescribed to him if his work experience with the given or same type machinery installation is at least one year.

3.1.7 Technical documentation is to be available on board the ship. It is to contain essential technical data for measurements performance, the equipment performance log, equipment performance cards for every item of the Register technical supervision in accordance with the ship's maintenance schedule agreed with the Branch Office where the ship is registered.

3.1.8 Initial measurements of items parameters, whose results are to confirm their satisfactory technical condition with the quantity of every measurement not exceeding the permissible value, are to be carried out on every ship prior to its change-over to the maintenance "as to the condition" with use of readings of integral systems and portable equipment for testing. The measurements results signed by the person conducting the measurements and by the chief engineer are to be submitted to the Register Branch Office where the ship is registered.

3.1.9 In every survey of ship's items, the results of testing after the previous survey are to be submitted to the Surveyor.

3.1.10 Surveys shall be conducted in prescribed dates and no Surveyor's requirements and remarks unfulfilled by a shipowner, as well as non-rectified damages of a ship or items which will impact surveys performance with use of readings of integral systems and portable equipment for testing are to be noted.

3.1.11 Reliability of readings of newly-applied integral systems and portable equipment for diagnostics and non-destructive testing not specified in these Instructions and unknown to the Register is to be confirmed on the basis of check comparative surveys in contrast with integral systems on two similar items of supervision with their subsequent opening-up witnessed by the Surveyor to the Register. With the negative results of the check comparative survey, their cause is to be identified, and if the cause is due to wrong measurements, the check comparative surveys are repeated at three similar items. The above surveys of items using integral systems and portable equipment for diagnostics and non-destructive testing are recommended to conduct at the same type items fitted on the ships of different series. The same type items mean the ones of similar structural design. With the positive results of surveys confirming the convergence of readings of integral systems and portable equipment for diagnostics and non-destructive testing with the actual condition of dismantled items witnessed by the Surveyor to the Register, the surveys without dismantling with use of readings of integral systems and portable equipment for diagnostics and non-destructive testing may be applied to all the items of the same type fitted on the ships registered in the Register Branch Office where the ship is registered. The Register Branch Offices are to send to the RHO their conclusions on the potential use of readings of the tested integral system and portable equipment for diagnostics and non-destructive testing.

3.2 The Register Branch Office where the ship is registered determines the necessity of Surveyor's participation in pre-repair fault detection, as well as in testing items of supervision during a voyage, and

reserves a right to check the pre-repair fault detection and the results of its measurements conducted without its representative.

3.3 Portable equipment for testing is to be provided with documents or to have stamps of certification by the Gosstandart Services or departmental metrological service properly authorized.

4 DOCUMENTS

4.1 The results of measurements and readings of integral systems and portable equipment for diagnostics and non-destructive testing are to be recorded by the shipowner in ship's logs and technical condition cards for every of item supervision, and the dates of technical inspections performance, in ship's schedules. The results of surveys conducted with use or readings of integral systems and portable equipment for diagnostics and non-destructive testing are to be noted by the Surveyor in reports of periodical surveys or in the Report on Survey of the Ship (Form 6.3.10).

Integral testing systems are to have the Type Approval Certificate (Form 6.8.3).

5 LIST OF ITEMS OF TECHNICAL SUPERVISION COVERED BY SURVEY WITHOUT DISMANTLING WITH USE OF PORTABLE EQUIPMENT FOR DIAGNOSTICS AND NON-DESTRUCTIVE TESTING

5.1 Electric motors;

vane and displacement pumps (except piston pumps, pumps of steering gear and drives of a pitch actuating mechanism and blade adjustment mechanism);

oil and fuel separators (non-destructive testing of bodies of bowls and vertical shafts of separators is carried out regardless of their condition determined by a dismantling-free inspection);

fans;

ship's piping (as to the measurement of thicknesses and detection of defects);

hull structures (as to the measurement of thicknesses and detection of defects of ship's shell plating and hull framing).

The application of surveys without dismantling to the other items of the Register technical supervision may be considered only after confirmation of compliance of readings of integral systems and portable equipment for diagnostics and non-destructive testing in use with the actual condition of dismantled items. In this case, the integral systems and portable equipment for diagnostics and non-destructive testing are to completely characterize the actual technical condition of items of technical supervision.

4. INSTRUCTIONS FOR SURVEY OF LIFEBOUYS AND LIFEJACKETS AT SPECIALIZED LOCATIONS INTENDED FOR SURVEY, TEST AND REPAIR OF PERSONAL LIFE-SAVING APPLIANCES

1 GENERAL

1.1 The present Instructions cover personal life-saving appliances (lifebuoys and lifejackets) the ships under the Register technical supervision are provided with.

1.2 The survey of lifebuoys and jackets at specialized locations recognized by the Register is conducted at least once in 5 years and also after repair.

1.3 The survey of lifebuoys and jackets is carried out by the technical staff of specialized locations certified for these works performance. Certificates for specialized location's employees are issued by a commission, whose members are the representatives of the location's owner and the Register, following passing relevant tests.

1.4 A survey includes: the check of buoys and jackets marking for every ship, external examination, strength and flotation tests, the check of additional equipment completeness (retro-reflective stripes, self-igniting lights, smoke signals, lifelines, signal whistles), issuing of documents according to the survey results and informing the Register Branch Offices of identified deviations from the Rules requirements.

1.5 All the lifebuoys and lifejackets on board the ship are subject to a survey except those whose service life does not exceed 5 years since their manufacture.

1.6 The lifebuoys and lifejackets selected among the remaining ones after rejection for limiting condition characters are subject to tests (5 per cent of the total number, but at least 2 pcs.). This number may be increased or reduced proceeding from the technical condition of personal life-saving appliances.

With the negative results of tests for 50 per cent or more of lifebuoys (lifejackets), all the remaining ones are subject to testing.

1.7 Rejection is carried out at a specialized location by competent employees and witnessed by the shipowner's representative.

1.8 The lifebuoys and lifejackets not complying with the requirements for limiting condition characters or due to the test results are to be replaced.

1.9 If some defects of lifebuoys and lifejackets are detected prior to strength test performance (break of a grab line or strips for its attachment), their rectification is carried out at a specialized location prior to a survey.

2 EXTERNAL EXAMINATION OF LIFEBOUYS

2.1 All the lifebuoys submitted are to be examined as to the condition of a cover material (for lack of ruptures, shabbiness, rotting) and the intact condition of cork or another material used for lifebuoy filling, and the condition of all seams of its joints.

Lifebuoys are not approved for further strength and buoyancy tests if defects corresponding to limiting condition characters are detected in examination (see Section 8).

3 STRENGTH TESTS OF LIFEBOUYS

3.1 In strength tests, a lifebuoy shall be dropped flat into water from the height at which it is stowed on the ship at its lightest service draught, or from 30 m, whichever is greater, and three times from a height of

2 m onto a concrete floor. Following the tests, no changes of a lifebuoy shape, surface and internal ruptures of a fabric and joints are allowed.

Thereafter the lifebuoy is to be suspended by a 50 mm wide strap. Another similar strap is to be passed around the opposite side of the lifebuoy with a load of 90 kg in mass suspended from it. In 30 min, the lifebuoy is to be examined. There shall be no ruptures, cracks or permanent set.

4 BUOYANCY TESTS OF LIFEBOUYS

4.1 The lifebuoys that had passed strength tests are admitted to this type of tests. The lifebuoy with a load of 14,5 kg in mass suspended from it is to be placed into a tank filled with fresh water for 24 h. The lifebuoy is not to sink.

The lifebuoy is to remain afloat during the whole period of testing.

5 EXTERNAL EXAMINATION OF LIFEJACKETS

5.1 All the lifejackets submitted are to be examined. In examination the following is to be checked: the cover material condition for absence of ruptures, shabbiness, cracks, cuts and rotting, and the integrity of cork or the other material used for filling the lifejacket, as well as the condition of all seams of joints and of straps.

Lifejackets are not approved for further strength and buoyancy tests if defects corresponding to limiting condition characters are detected in examination (see Section 8).

6 STRENGTH TESTS OF LIFEJACKETS

6.1 A lifejacket is to be immersed in water for 2 min. It is then to be removed from the water and done up so as worn by a person. A force of at least 3200 N (2400 N for the child-size jacket) is to be applied during 30 min to the part of the jacket that holds it onto a human body or to the lifting loop of the jacket. Following the test, absence of damages to the lifejacket is to be checked.

6.2 In order to test the jacket shoulder for strength, the lifejacket is to be immersed in water for 2 min. Thereafter it is to be removed from the water and done up so as worn by a person. A force of at least 900 N (700 N for the child-size jacket) is then to be applied for 30 min to the shoulder section of the jacket. Following the test, absence of damages to the jacket is to be checked.

7 BUOYANCY TESTS OF LIFEJACKETS

7.1 The lifejackets that had passed strength tests are approved for the buoyancy test. The buoyancy of the lifejacket is to be measured prior to and after a complete submersion for 24 h in fresh water just below its surface. The difference between the initial and final measurements is not to exceed 5 per cent of the initial lifejacket buoyancy.

8 LIMITING CONDITION CHARACTERS OF LIFEBOUYS AND LIFEJACKETS

8.1 The defects being limiting condition characters of lifebuoys and lifejackets and used for their rejection and withdrawal from further service (supply) are:

- rotting of a cover material;
- change of the lifebuoy shape;

surface and internal ruptures after strength tests.

If external defects of the lifebuoys and lifejackets fabric are detected, the partial disassembly and opening-up of a cloth (cover) are carried out in order to take decision on potential repair. In this case, if the signs of the filler defects are identified in lifebuoys and lifejackets (with the filler of plate-like cork), they are not allowed for the further service as well. The following refers to the above signs:

- cracks having a depth more than half the cork thickness;

- crumbling, rotting, hardening of cork;

- green, yellow and brown stains on the cork surface;

- blackness and worm-holes in the cork canals;

- presence of ground cork in the filler;

- scallops, bulges, blisters, cracks and traces of the casting and fin seal on the external surface of the lifebuoys and lifejackets filled with foam aerite or the other types of plastic materials.

9 ADDITIONAL EQUIPMENT COMPLETENESS CHECK FOR LIFEBOUYS AND LIFEJACKETS

9.1 During the examination the following is to be checked:

- presence and the technical condition of self-igniting lights and smoke signals (absence of damages to a housing and fittings, serviceability of the electric circuit and lighting fixtures);

- presence of batteries of a set model, serviceable signal whistles, the necessary number of retro-reflective stripes of a set model, lifelines;

- their compliance with the requirements and service life.

10 EXECUTION OF SURVEY RESULTS AND DOCUMENTS

10.1 The lifebuoys and lifejackets that had passed the survey and are recognized complying for further service are marked with the month and year of the special survey and the stamp of the specialized location. The marking is made in black indelible paint across the painted surface. In the follow-up surveys, the marking made in previous surveys is painted over.

The results of the lifebuoys and lifejackets survey are recorded at the specialized locations in a log and in the report of a set form and witnessed by the signature and stamp of the specialized location's head.

The report is issued to the representative of the ship's officers for the lifebuoys and lifejackets that have passed the survey and are recognized complying for further service.

5. EVALUATION OF LIMIT SEA STATES BASED ON SHIP'S HULL STRENGTH

1. In order to roughly evaluate the limit sea state in passage of a ship outside the prescribed area of navigation based on ship's hull strength, the methods given below may be used.

2. Ships with longitudinal strength of the hull inadequate for the passage area:

.1 the design ultimate wave height $h_{3\%}$ determined by the conditions of longitudinal strength (for the most weakened cross-section amidships) is defined by the formula

$$h_{3\%} = \frac{2(M_u - M_{sw})}{C_B B L (L - 2x)} \leq 2d \quad (2.1)$$

where M_u = ultimate bending moment for the hull cross-section in question, in kN·m, determined according to 2.3;
 M_{sw} = still water bending moment at the hull cross-section in question for the loaded ship in passage, in kN·m;
 L , B and d = ship's length, breadth and draught in passage respectively, in m;
 C_B = ship's block coefficient at the displacement in passage;
 x = distance from the hull cross-section in question to the amidships, in m ($x = 0,2L$ if $x < 0,2L$).

The draught restriction as applied to the design wave height may be ignored if the relevant calculations confirm the sufficiency of longitudinal strength at $h_{3\%} > 2d$.

If the draught restriction as applied to the design wave height is a very strict requirement, it may be ignored if it will be demonstrated in the design that the strength margin available ensures the longitudinal strength of the hull subjected to increased dynamic loadings arising at height $h_{3\%} > 2d$;

.2 the absolute difference of M_{ux} and M_{swx} is calculated subject to their signs.

M_{ux} and M_{swx} are assumed positive in hogging and negative in sagging;

.3 an ultimate bending moment M_{ux} for the hull cross-section in question is assumed equal to the lesser of values determined by the following formulae:

$$M'_{ux} = \frac{I}{Z_{\max}} R_{eH} 10^{-5} ; \quad (2.3-1)$$

$$M''_{ux} = \frac{I}{Z_i} \sigma_{cr} 10^{-5} \quad (2.3-2)$$

where R_{eH} = the upper yield stress of steel, in Mpa;
 Z_{\max} = distance from the horizontal neutral axis of the hull cross-section in question to the most remote member in tension, in m;
 I = inertia moment of the ship's hull cross-section in question about the horizontal neutral axis, in cm⁴;
 Z_i = distance from the horizontal neutral axis to the centre of gravity of the cross section of the i -th compressed member of the strength deck, bottom or inner bottom (carling, bottom stringer, longitudinal), in m.
 σ_{cr} = critical stress of the i -th member specified, in MPa, in the hull cross-section in question.

The possibility of reducing the flexible members (plates) subjected to rated compressing stresses shall be considered when the hull cross-section inertia moment is determined. In this case, the plate parts adjacent to longitudinals on each side within 0,25 of the size of the short side of a support contour are not subject to reducing. The flexible member parts being reduced are entered into calculation with a reduction factor ψ determined by the formula

$$\psi = \sigma_{cr} / \sigma_{rm} \quad (2.3-3)$$

where σ_{cr} = critical stress of the i -th plate, in MPa, in the hull cross-section in question;
 σ_{rm} = compressing stresses in rigid members due to a longitudinal bending, in MPa.

3. The height of a design wave with 3 per cent probability for the ships having local hull strength inadequate for the passage area is determined on the basis of the quantity of a rated load p which does not cause stresses in hull members over the following values:

0,85 R_{eH} – for floors and web frames;

R_{eH} – for stringers and keelsons;

R_{eH} – for shell plating;

0,80 R_{eH} – for framing and plating of superstructure end bulkheads and deckhouse walls,
where R_{eH} = yield strength of steel.

The wave height with 3 per cent probability $h_{3\%}$, in m, is determined for different grillages by the following formulae:

.1 for bottom and side plating and framing amidships

$$h_{3\%} = \frac{4}{3} (0,1p - d) \quad (3.1-1)$$

where p (for bottom) = uniform load, in kPa;

p (for sides) = design head of the load at the bottom level distributed to a triangle or trapezoid, in kPa;

d = ship's draught, in m.

The counter pressure P_L , in kPa, of a cargo (ballast) on the bottom may be considered for the members carrying this counter pressure as follows:

$$\text{at } P_L \leq 10d \quad h_{3\%} = \frac{4}{3} (0,1p - d + 0,1P_L); \quad (3.1-2)$$

$$\text{at } P_L > 10d \quad h_{3\%} = \frac{4}{3} (0,1p + d - 0,1P_L). \quad (3.1-3)$$

The counter pressure of a liquid cargo only may be considered for sides;

.2 for bottom within 0,25 L from the fore perpendicular

$$h_{3\%} = \frac{2}{3} (0,1p - d) \quad - \quad \text{for a wedge-shaped forward end}; \quad (3.2-1)$$

$$h_{3\%} = \frac{1}{2} (0,1p - d) \quad - \quad \text{for a spoon-shaped forward end}; \quad (3.2-2)$$

$$h_{3\%} = \frac{2}{5} (0,1p - d) \quad - \quad \text{for a sledge-shaped forward end} \quad (3.2-3)$$

where p = uniform load on bottom, in kPa;

.3 for end superstructure bulkheads and deckhouse walls on the exposed deck

$$h_{3\%} = k_p(0,07L + l) \quad (3.3)$$

where

$k = 1$ – for forward bulkheads;

$k = 2$ – for forward walls of deckhouse;

$k = 4$ – for aft bulkheads;

p = uniform load on the wall (bulkhead), in kPa.

4. Restrictions on the limit sea state from the conditions of longitudinal (see item 2) and local (see item 3) strength are established from the least calculated value of a wave with 3 per cent probability. However, in all cases the least wave height is to be assumed not greater than $2d$.

The limit sea state is determined in accordance with Table 4 from the least wave height with 3 per cent probability. The wave height according to the Table is assumed equal to the arithmetic mean of extreme wave heights specified in Table for the given sea state.

If the design wave height with 3 per cent probability is under 1,5 m, the possibility of a sea passage for such a ship without hull reinforcements shall be considered by RHO in order to take special precautions for actual prevention of an opportunity to violate weather restrictions during the passage.

Table 4

Wave height with 3 per cent probability, in m	Mid-range (interval), m	Degree of sea state, numbers	Seas
0,75 — 1,25	1,00	3	moderate (rough) sea
1,25 — 2,0	1,63	4	rough sea
2,0 — 3,5	2,75	5	rather rough sea
3,5 — 6,0	4,75	6	rather rough sea
6,0 — 8,5	7,25	7	precipitous sea
8,5 — 11,0	9,75	8	precipitous sea

No strength restrictions are specified when the design wave height with 3 per cent probability is 10 m and over.

5. For ships which have not yet approached the residual thickness measurement dates prescribed for the relevant ship age and type by the Rules, as-built scantlings of the hull members shall be adopted as effective ones. For hulls in respect of which residual thickness measurements are assumed in compliance with the Rules conditional on the age and type, actual residual thicknesses of the hull members shall be adopted as effective ones proceeding from proper hull condition assessment reports.

6. EVALUATION OF LIMIT WIND FORCE BASED ON SHIP'S STABILITY

In order to roughly evaluate the limit wind force based on ship's stability, the method given below may be used.

The limit wind force is determined depending on the parameter P calculated by the formula

$$P = 109k_6 \sqrt{\frac{l_m D \theta_c}{(A - B \theta_c) S_w}} (1 - 1,4 \theta_m / \theta_v)$$

where k_6 = coefficient of wind velocity reduction to a height of 6 m above the sea level determined by the formula

$$k_6 = 1,11 - 0,02(Z_w - T);$$

S_w = windage area, in m²;

Z_w = elevation of the centre of effort above the base plan, in m;

T = ship's draught, in m;

D = ship's displacement, in t;

θ_m = roll amplitude, in degrees, recommended to be assumed according to the data of model and full-scale tests or according to a calculation. If those data are lacking, it may be determined by the formulae given in Part IV "Stability" of the Rules for the Classification and Construction of Sea-Going Ships;

θ_v = angle of vanishing stability, in rad;

θ_c = capsizing angle, in deg;

l_m = mean arm corresponding to the capsizing angle, in m, determined by the formula

$$l_m = 1/\theta_c \int_0^{\theta_c} l d\theta;$$

$$A = Z_w - T/4 - Z_g/2;$$

$$B = 0,155(Z_w - T);$$

Z_g = elevation of the ship's centre of gravity above the base plane, in m.

The limit wind force is determined by the determined parameter P in accordance with the Table.

Table

P , in m/s	Wind	Limit wind force
1,0	calm	0
3,2	light air	1
6,2	light breeze	2
9,6	gentle breeze	3
13,6	moderate breeze	4
17,8	fresh breeze	5
22,3	strong breeze	6
26,2	high wind	7
31,6	fresh gale	8
36,7	strong gale	9
42,0	whole gale	10
47,5	storm	11
53,0	hurricane	12

The wind force obtained is to be corrected to match the materials of service experience of ships similar in type. If such a material is unavailable, the determined limit wind force is to be reduced by a number.

The calculation of the limit wind force is to be effected for loading under the conditions of a passage with minimum stability.

7. PROVISION OF FLOATING DOCKS WITH ANCHORS AND ANCHOR CHAINS FOR A SINGLE PASSAGE

1. A floating dock is to be provided with at least two anchors for the passage period. The mass of each anchor Q , in kg, is to be not less than determined by the formula

$$Q = 35S \quad (1)$$

where S = windage area of the above-water part of the floating dock front surface at the draught adopted for the dock's passage, in m^2 .

2. Each anchor is to have an anchor chain of a diameter not less than determined by the formula

$$d = k\sqrt{Q} \quad (2)$$

where k = factor equal to:
 0,80 – for ordinary chains (grade I);
 0,72 – for special quality chains (grade II);
 0,62 – for extra special quality chains (grade III).

3. The length of the anchor chain l , in m, is to be not less than determined by the formula

$$l = 180\sqrt{Q}/d_1 \quad (3)$$

where d_1 = actual diameter of an anchor chain, in mm.

4. Each anchor chain is to be provided with a device to secure and release the inboard end of the chain.

This device, its units and pieces, as well as its attachments to the pontoon deck and the reinforcement of the latter are to be designed for a force equal to the breaking load of the anchor chain; stresses therewith are not to be over 0,95 of the yield strength of the material.

5. Each anchor chain is to be provided with the device or arrangement (e.g. arresters of a natural or synthetic fiber rope) ensuring safety in dropping anchor and the full length of an anchor chain at a depth of at least 60 m.

6. Throughout the aspects not specified in this Annex regarding anchors, anchor chains, devices to secure the inboard end of anchor chains, stoppers (if any), laying of anchor chains, etc., the Rules for the Classification and Construction of Sea-Going Ships are to be followed.

7. If agreed with the Register, the provision of a floating dock with anchors and anchor chains may be omitted when the passage of the floating dock is carried out within an enclosed sea with due regard for specific arrangements ensuring passage safety (see 8.3.1, Part II "Carrying out Classification Survey of Ships" of the Guidelines).

8. PROVISION OF FLOATING DOCKS WITH TOW LINES FOR A SINGLE PASSAGE

1. For a floating dock with parallelepiped-shaped pontoons, the overall drag R , in kN, in tow under the specified conditions of a passage is determined by the formula

$$R = 0,141 B d v^2 + 2,243 \cdot 10^{-2} C_x L (H - d) h_{3\%} + 0,72 \frac{\alpha B^2}{L} h_{3\%}^2 \quad (1)$$

where B, L = breadth and length of a floating dock, in m;
 d = maximum draught of a floating dock in passage, in m;
 v = ultimate speed of a floating dock towing at the limit sea state adopted for a passage, in knots (see 8.3.1, Part II "Carrying out Classification Survey of Ships" of the Guidelines);
 C_x = air-drag coefficient equal to:
 0,2 – for ordinary docks;
 0,3 – for docks fitted for a passage with a roof and end closures;
 H = depth up to the top deck, in m;
 $h_{3\%}$ = wave height with 3 per cent probability at the limit sea state adopted for a passage, in m;
 $\alpha = 1$ at $(v/\sqrt{L}) \leq 0,1$;
 $\alpha = 6,1(v/\sqrt{L}) + 0,33$ at $(v/\sqrt{L}) > 0,1$.

2. The overall drag R of the floating dock, whose underwater part is significantly distinct from a parallelepiped, being towed at the ultimate speed v and limit sea state with due regard for air drag is to be determined by calculation according to the procedures recognized by the Register.

3. When a floating dock is towed at one tow line, the breaking load of a steel tow line P_1 , in kN, at large is to be assumed not less than determined by the formula

$$P_1 = s_1 R \quad (3)$$

where s_1 = conditional safety margin ensuring (with an appropriate line length – see item 5) safe towing at the limit sea state with an actual safety margin $s_2 = 2$. As a rule, s_1 is to be assumed not less than 4.

4. When a floating dock is towed at two parallel tow lines, the breaking load of each steel tow line P_2 , in kN, at large is to be assumed not less than determined by the formula

$$P_2 = 0,55 s_1 R \quad (4)$$

5. The length of each steel tow line l , in m, for the towing specified in items 3 and 4 is to be selected according to the data of Fig. 5 depending on the limit sea state and the s_1 value assumed.

6. The length of a tow line specified in item 5 may be reduced down to 350 m if a towing line includes the insert in one or more legs of a synthetic fiber rope. In this case:

the total breaking load of insert ropes (at large) is to be not less than 1,4 times that of the tow line specified in item 3 or 4;

an insert length, in m, is to be at least:

35 – for very rough sea and calmer;

55 – for high sea;

75 – for very high sea;

100 – for precipitous sea.

7. If a towing line includes an anchor chain (secured on a floating dock), its breaking load is to be not less than that of a steel rope used in the towing line. If the towing line includes "whiskers", the forces in their legs are to be determined with due regard for the length of the legs and the distances from the points of their securing.

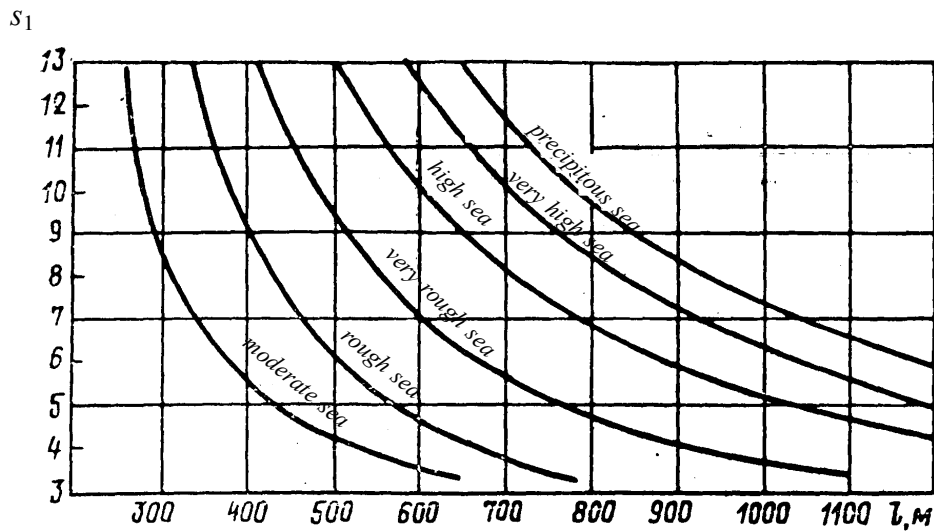


Fig. 5

Selection of a tow line length depending on s_1 and sea state

Anchor chains and "whiskers" are included in the total length of the tow line.

8. For a passage, floating docks are to be provided with two sets of tow lines (basic and spare). The spare set of the tow line (lines) is to meet the requirements for the basic set given in this Annex.

9. Throughout the aspects not specified in this Annex regarding tow lines (basic and spare), the Rules for the Classification and Construction of Sea-Going Ships are to be followed. The spare set of the tow line (lines) is to meet the requirements for the basic set given in this Annex.

10. The limit sea state, draught d and speed v assumed in the calculation of tow lines for the dock passage are noted in the appropriate Certificate (either in Classification Certificate or Towing Certificate depending on the case considered).

9. PROVISION OF TOWING SHIPS WITH TOW LINES FOR A SINGLE PASSAGE (RECOMMENDATIONS)

1. A towing ship is to be provided with at least two steel tow lines, each is to comply with the bollard pull of the towing ship.

The breaking load of a tow line is to be calculated in accordance with Formula (5.4.2.2), Part III "Equipment, Arrangements and Outfit" of the Rules for the Classification and Construction of Sea-Going Ships.

However the breaking load calculated according to the above formula is not to be more than is not to be more than 4 times and less than 2 times the static pull of a towing ship on a tow hook.

2. The main tow line is to be stowed and secured in the main drum of a towing winch, and the spare tow line is to be stored on a specially-intended reel or a drum supplied along with the tow line being easily rewound on the main drum of the towing winch, or, what is more preferable, to be stowed and secured on the second drum of the towing winch.

3. Technical parameters of a towing winch are to be consistent with the dimensions of a tow line to ensure its proper and complete stowage on the winch drum.

4. Ends of a tow line for ocean towages are to be provided with closed eyes. Splicing of a damaged line is not allowed and it is to be replaced or cut if its length is sufficient.

5. A towing ship is to have in store sufficient number of tow pendants (4 as a minimum) of the steel wire of different length (e.g. from 20 m to 80 m) with the same characteristics as those of the main tow line, provided with reinforced galvanized steel thimbles at their ends. Making eyes for pendant thimbles the ends of the steel wire are to be crimped by means of cramps of the "super loop" type.

6. Where a steel wire pendant is supposed to be used in a towing line as a safety insert and such an application is approved, its breaking strength is to be calculated by the above formula for the towing line at large. In this case, the main tow line is to have the breaking strength not more than by 10 per cent greater as compared to that calculated by the formula specified in item 1.

7. Where a pendant from a synthetic fiber rope based on polyamide or another suitable material is used as a shock-absorber ("spring"), its breaking strength is to be by 25 per cent greater than that of the main tow line. Such shock-absorbers are usually made in the form of a rope ring folded in half. In this case, the break strength of each of the two ring branches is to be equal to that of the main tow line since the total breaking strength of such a ring is only by 1,6 times greater than the breaking strength of its two branches.

Synthetic fiber ropes are subjected to fatigue and ultraviolet ageing and, therefore, to be thoroughly checked and to look like new, and, in some cases, are not allowed for use in a towing line at all.

8. A chain pendant is to be used to prevent friction of a tow line in places where a towing line runs through guides on a towed object. Such a chain may also be used for damping of towing line jerks in rough sea at the cost of the increase of line sag by the action of the chain mass, the distinction is only in that such a chain is longer than the chain pendant (e.g. 30 m and 6 m respectively).

9. The ship is to be provided with the sufficient number of shackles for re-rigging of the entire towing line in case of its break.

Six full-sized shackles, as a minimum, are to be provided for a towing line comprising a steel tow line, steel wire pendant, chain pendant and hauling line. The shackles are to have a safe work load equal to the static bollard pull of the towing ship, to be of the safe type (i.e. a bolt with a nut and split pin, but in no case with one screwed-down pintle) and to have anti-corrosive protection on the tugs of high power.

10. Certificates of breaking load testing for the entire equipment for towage (i.e. for steel wires, chains, synthetic fiber ropes and shackles) are to be kept onboard the towing ship.

11. The set of tools and spare equipment including steel wire slings, steel wire coils, chain stoppers, canvas, chemicals for reconditioning of worn-out locations, etc. is to be maintained on board the towing ship.

12. Dunnage boards are to be provided for the main tow line as one of materials used for reducing line chafing.

10. HULL TIGHTNESS TEST

Nos.	Structure	Test procedures and standards	Additional instructions
1	Forepeak and afterpeak used as tanks	Flooding up to the air pipe top, but at least 2,4 m from the top point of a tank	Afterpeak to be tested with the stern tube and rudder trunk fitted
2	Forepeak not used as a tank	Flooding up to the bulkhead deck	Where a hatch coaming is available, a forepeak is flooded up to the top edge of the hatch coaming, but not more than 0,3 m above the bulkhead deck, and hose testing above that level
3	Afterpeak not used as a tank	Air test	—
4	Double bottom compartments, duct keel, log and echo sounder trunks	Flooding up to the bulkhead deck or the top of an air pipe (whichever is greater) ¹	Structures bounding compartments to be tested on at least one side
5	Compartments of ship's double side	Flooding up to the air pipe top, but at least 2,4 m from the deck bounding the compartment from above ¹	—
6	Ballast-distributing ducts	Flooding to the head equal to the maximum pressure of a ballast pump	—
7	Cargo holds, engine and boiler rooms of dry cargo ships with double bottom	Hose testing over the entire surface above double bottom ²	—
8	Cargo holds, engine and boiler rooms of dry cargo ships without double bottom	Flooding to a height of 1 m above the bottom shell plating at the keel and hose testing above that level ²	—
9	Tween deck compartments	Hose testing ²	—
10	Tanks outside double bottom including tanks for liquid oil products of a ship's fuel store, circulating and service tanks, tanks for storage of vegetable oil, whale oil and other liquid cargoes (on dry cargo ships and catching vessels)	Flooding up to the air pipe top, but at least 2,4 m from the deck bounding the compartment from above, or by the pressure for which a safety valve (if any) is adjusted ¹	For tanks with air pipes led into a manifold, the test head is assumed up to the manifold top, but at least 2,4 m from the deck bounding the compartment from above. The structures bounding the tanks are to be tested on at least one side
11	Cargo tanks of tankers and cargo holds of dry cargo ships which can be filled with liquid cargo or ballast	Flooding up to the air pipe top or the top of an expansion trunk, but at least 2,4 m from the deck bounding the compartment from above ¹	If flooding is impracticable while on a slipway or in a dock, it may be carried out, on agreement with the Register, after launching. Prior to launching, all cargo tanks (holds) are to be air-tested. When afloat, one centre and two side tanks (holds) selected by the Surveyor are simultaneously tested by flooding. In this case, the relative positions of those spaces is to correspond to the most severe loading conditions
12	Cofferdams	Flooding up to the air pipe top, but at least 2,4 m from the plating bounding the cofferdam from above ¹	Cofferdams in a double-bottom space are to be tested like double-bottom compartments (see item 4 of the Table)
13	Sea chests and ice boxes	Flooding up to the level of 1,25 times the ship's depth, but not less than the pressure in the blowing system	During testing of steam-heated ice boxes, the water test head is to be in all cases not less than the pressure in the heating system
14	Vent ducts located within the hull, superstructures and deckhouses	Air test	If the part or entire structure of vent ducts runs through compartments tested by flooding or air pressure, these ducts are tested during compartment tests unless otherwise provided in the technical

Continued

Nos.	Structure	Test procedures and standards	Additional instructions
15	Shaft tunnel, enclosures and escape trunks, as well as tight trunks (including engine-room trunks, boiler uptake and funnel casings)	Hose testing ²	documentation —
16	Chain lockers aft of the collision bulkhead	Flooding up to the locker top	Chain locker structures (or part thereof) located forward of the collision bulkhead subjected to water pressure during forepeak tests by flooding may not be re-tested
17	Chain lockers forward of the collision bulkhead	Hose testing ²	—
18	Compartments inside the stern counter	Flooding up to the height corresponding to a full-load waterline and hose testing above that level	—
19	Superstructures and deckhouses (including exposed parts of engine-room trunks and funnel casings)	Hose testing	—
20	Exposed parts of decks (including decks of super-structures and deck houses)	Hose testing	On tankers, the parts of exposed decks in the area of cargo tanks are tested simultaneously with the appropriate compartments (see item 11)
21	Coamings of hatches and vent pipes on exposed parts of the upper deck, as well as of superstructure and deckhouse decks	Hose testing	Coamings up to 100 mm high may be tested by wetting with kerosene
22	Doors in subdivision bulkheads	Water column pressure up to the bulkhead deck in height or up to the freeboard deck respectively, but at least 0,9 m above the deck bounding the compartment from above	Doors may be tested prior to or after their fitting. If tested prior to the fitting on the ship, the door shall be tested with an air jet or by another way approved by the Register after its fitting on board
23	Closing appliances for openings in weathertight hull parts: doors in outer bulkheads of superstructures and deckhouses; covers of skylights and companion hatches; side scuttles in upper decks and sides of the hull, in decks and outer bulkheads of superstructures and deckhouses; covers of manholes in tight decks, platforms and bulkheads; outer closures of garbage chutes; ports	Hose testing	Closing appliances for openings (manhole covers, hatch covers, slide valves, etc.), as well as air, sounding and other pipes fitted in double-bottom and other compartments tested by flooding are to be tested simultaneously with the test of these compartments
24	Tight hatch covers of tanks on tankers and oil/bulk carriers	Flooding up to the air pipe top, but at least 2,4 m from the hatch cover top point, or by pressure the safety valve (if any) is adjusted for ¹	Tests are to be conducted simultaneously with the test of tanks fitted with hatch covers. At least each second hatch cover is to be tested by flooding to a head of 2,4 m from the hatch cover top point
25	Weather-tight hatch covers of dry cargo ships	Hose testing	—
26	Hawse pipes and chain pipes	Hose testing	—
27	Hollow (streamlined) rudders, voids of fixed and steering nozzles, hollow components of foil arrangements	Air test	—
28	Independent water, fuel and lubricating oil tanks	Flooding up to the top of an air or overflow pipe, but at least 0,9 m from the top point of the tank	Independent tanks are to be tested twice: prior to and after their fitting on the ship

Continued

Nos.	Structure	Test procedures and standards	Additional instructions
29	Independent tanks of tankers carrying food liquids	Flooding up to the air pipe top, but at least 0,9 m from the top point of the tank	with pipelines joined thereto —
30	Tanks and independent tanks of chemical tankers	Flooding to a head of 2,4 m from the upper boundary of the tank, but not less than the pressure for which a safety valve, if any, is adjusted	Structures bounding cargo spaces are to be tested on at least one side
31	Collecting sewage tanks	Flooding to a head equal to 1,5 times the water column pressure from the tank bottom to the lower sanitary fixture having no lock on a discharge pipeline, but at least 25 kPa	—
32	Thruster compartments, air boxes, buoyancy	Flooding up to the bulkhead deck ¹	—
<p>¹ On agreement with the Register, air tests by an excessive pressure of $2 \cdot 10^4$ Pa may be allowed. At least on compartment or tank of each type therewith is to be tested by flooding. The substitution of flooding with air tests does not cover the structures bounding cargo spaces of tankers and oil/bulk carriers, as well as the tanks for carriage of incompatible liquid cargoes and cargoes polluting the environment. Where flooding tests identify inadequate strength or other significant defects of the compartment or tank not detected in air tests of similar spaces, all compartments and tanks are to be subjected to structural tests.</p> <p>² If hose testing is impossible due to a potential damage to the installed equipment, or to the large scope of works for its dismounting, the substitution of this testing with the thorough check of all the nodes of structural components and welds intersection is allowed on agreement with the Register. Where needed, the Register may demand carrying out the tests of welds by wetting with kerosene (except overlap joints), by compressed-air jet or carrying out a penetrant, ultrasonic or other testing of the approved type.</p> <p>Notes: 1. The procedures and standards of tightness tests in special surveys, repairs and the renovation of ships are to comply with the instructions of this Table.</p> <p>2. For ships with a depth under 5 m, the structures specified in items 5, 9 to 12 may be tested to a head equal to 0,5 of the ship's depth, but at least 1,5 m.</p> <p>3. A head in special surveys may be determined proceeding from flooding: up to the top of air or overflow (if any) pipes – for water and fuel tanks; up to the top of expansion trunks or hatch coamings – for cargo compartments and cofferdams of tankers.</p> <p>4. When tested in dock, the flooding is allowed up to the level of a light waterline, and up to the top edge of expansion</p>			

11. INSTRUCTIONS FOR SURVEY OF SHIPS FOR FITNESS FOR THE CARRIAGE OF NON-GRAIN BULK CARGOES

1 GENERAL PROVISIONS

1.1 Survey of ships on fitness for the carriage of non-grain bulk cargoes shall be carried out following the requirements of:

Parts A and B of Chapter VI "Carriage of Cargo" and Chapter VII "Carriage of Dangerous Goods" of SOLAS-74 as amended;

International Maritime Solid Bulk Cargoes (IMSBC) Code adopted by IMO resolution MSC.268(85) as amended;

RD 31.11.01-92 "Rules for the Safe Carriage of Non-Grain Bulk Cargoes" for ships flying the flag of the Russian Federation, as well as the Rules for the Carriage of Grain of the Register or IMO Resolution MSC.23(59) "International Code for the Safe Carriage of Grain in Bulk", if applicable.

2 SURVEY

2.1 The availability of the following approved documents on board ship is to be checked:

Stability and Strength Information (booklet) when non-grain bulk cargoes are carried;

Loading Manual;

Grain Loading Stability Information (if provision is made for the carriage of cargoes the transportation properties of which are similar to those of grain),

as well as documents on survey of loading instrument of approved type (if any).

2.2 Where the ship in conformity with the Information on Stability and Strength (booklet) when non-grain bulk cargoes are carried is provided with special structures, arrangements, systems, equipment or outfit intended to ensure safety in carriage of non-grain bulk cargoes, such structures, arrangements, systems, equipment or outfit are to be surveyed to determine technical condition thereof. If the Surveyor is not satisfied with technical condition of particular structures, arrangements, systems, equipment or outfit he shall require appropriate repair to be done.

2.3 A survey of a ship in order to determine its fitness for the carriage of chemically hazardous bulk cargoes is to be conducted in accordance with the Instructions for Survey of Ships Carrying Dangerous Goods in Packaged Form and in Bulk.

3 CERTIFICATES

3.1 The Certificate of Fitness of the Ship for the Carriage of Bulk Cargoes (Form 2.1.18), Supplement to the Certificate of Fitness of the Ship for the Carriage of Bulk Cargoes (Form 2.1.19) are to be issued in accordance with the provisions of RD 31.11.01-92 "Rules for the Safe Carriage of Non-Grain Bulk Cargoes" of the RF for ships flying the flag of the Russian Federation, and, at the request of the Shipowner, for ships flying other flags, provided that the Register is authorized by the Flag State Administration to carry out technical supervision of the compliance with the requirements of Chapter VI "Carriage of Cargoes" and Chapter VII "Carriage of Dangerous Goods" of SOLAS-74 as amended.

3.2 The Certificates referred to in 3.1 are to be issued to ship only in case where the valid certificates specified by SOLAS-74 as amended and the International Convention on Load Lines, 1966, are available on board the ship.

3.3 The Certificate according to Form 2.1.18 and the Supplement according to Form 2.1.19 are to be issued for a period of not more than 5 years and are subject to annual confirmations.

12. INSTRUCTIONS FOR SURVEY OF SPECIAL PURPOSE SHIPS

1 GENERAL

1.1 In addition to the provisions of 2.1.6, Part III «Survey of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for the Equipment of Sea-Going Ships» of the Guidelines, this Annex contains the requirements of the Code of Safety for Special Purpose Ships, 2008, to be complied with by special purpose ships.

1.2 Special purpose ships engaged in international voyages, in addition to the Special Purpose Ship Safety Certificate shall have Certificates for compliance with the requirements of the SOLAS-74/78/88/00 and International Convention on Load Lines 1966/88, MARPOL 73/88.

2 STABILITY AND SUBDIVISION

2.1 The intact stability of special purpose ships should comply with the provisions of section 2.5 of Part B of the 2007 Intact Stability Code.

2.2 The subdivision and damage stability of special purpose ships shall in general be in accordance with Chapter II-1 of SOLAS where the ship is considered a passenger ship, and special personnel are considered passengers, with an R-value calculated in accordance with regulation II-1/6.2.3 of SOLAS as follows:

- .1** where the ship is certified to carry 240 persons or more, the R-value is assigned as R;
- .2** where the ship is certified to carry not more than 60 persons, the R-value is assigned as 0,8R; and
- .3** for more than 60 (but not more than 240) persons, the R-value shall be determined by linear interpolation between the R-values given in 2.2.1 and 2.2.2 above.

2.3 For special purpose ships to which 2.2.1 applies the requirements of SOLAS regulations II-1/8 and II-1/8-1 and of SOLAS chapter II-1, parts B-2, B-3 and B-4 shall be applied as though the ship is a passenger ship and the special personnel are passengers. However, regulations II-1/14 and II-1/18 of SOLAS are not applicable.

2.4 For special purpose ships to which 2.2.2 or 2.2.3 applies, except as provided in 2.5, the provisions of Parts B-2, B-3 and B-4 of Chapter II-1 of SOLAS shall be applied as though the ship is a cargo ship and the special personnel are crew. However, regulations II-1/8 and II-1/8-1 of SOLAS need not be applied and regulations II-1/14 and II-1/18 of SOLAS are not applicable.

2.5 All special purpose ships shall comply with regulations II-1/9, II-1/13, II-1/19, II-1/20, II-1/21 and II-1/35-1 of SOLAS, as though the ship is a passenger ship.

3 MACHINERY INSTALLATIONS

3.1 Subject to 3.2, the requirements of Part C of Chapter II-1 of SOLAS shall be met.

3.2 Steering gear

All installations shall be in accordance with regulation 29 of part C of chapter II-1 of SOLAS, except that installations in special purpose ships carrying not more than 240 persons on board should, when applicable, be in accordance with regulation 29.6.1.2 and installations in special purpose ships carrying more than 240 persons on board shall, when applicable, be in accordance with regulation 29.6.1.1.

4 ELECTRICAL INSTALLATIONS

4.1 Subject to 4.2 and 4.3, the requirements of Part D of Chapter II-1 of SOLAS shall be met.

4.2 Emergency source of power.

4.2.1 Installations in special purpose ships carrying not more than 60 persons on board shall be in accordance with regulation 43 of part D of Chapter II-1 of SOLAS and in addition special purpose ships of more than 50 m in length shall meet the requirements of regulation 42.2.6.1 of that Part.

4.2.2 Installations in special purpose ships carrying more than 60 persons on board shall be in accordance with regulation 42 of Part D of Chapter II-1 of SOLAS.

4.3 Precautions against shock, fire and other hazards of electrical origin.

4.3.1 All installations shall be in accordance with regulation 45.1 to 45.10 inclusive of Part D of Chapter II-1 of SOLAS.

4.3.2 Installations on special purpose ships carrying more than 60 persons on board also shall be in accordance with regulation 45.11 of Part D of Chapter II-1 of SOLAS.

5 PERIODICALLY UNATTENDED MACHINERY SPACES

5.1 Subject to 5.2, the requirements of Part E of Chapter II-1 of SOLAS other than regulation 46, shall be met.

5.2 Special purpose ships carrying more than 240 persons on board

Special purpose ships carrying more than 240 persons on board shall be specially considered by the Flag State Administration as to whether or not their machinery spaces may be periodically unattended, and, if so, whether additional requirements to those stipulated in this Chapter are necessary to achieve equivalent safety to that of normally attended machinery spaces.

6 FIRE PROTECTION

6.1 For ships carrying more than 240 persons on board, the requirements of Chapter II-2 of SOLAS for passenger ships carrying more than 36 passengers shall be applied.

6.2 For ships carrying more than 60 (but not more than 240) persons on board, the requirements of Chapter II-2 of SOLAS for passenger ships carrying not more than 36 passengers shall be applied.

6.3 For ships carrying more than 60 persons on board, the requirements of Chapter II-2 of SOLAS for cargo ships should be applied.

7 DANGEROUS GOODS

7.1 Special purpose ships sometimes carry a wide range of dangerous goods classified in accordance with the IMDG Code for use in scientific or survey work or a variety of other applications. These dangerous goods are often carried as ship's stores and are used on board and, therefore, they are not subject to the provisions of the IMDG Code. However, dangerous goods that are carried on board for shipment as cargo and are not used on board, are clearly subject to the provisions of the IMDG Code.

7.2 Notwithstanding the fact that the IMDG Code does not apply to dangerous goods carried as ship's stores and used on board, it contains provisions that are relevant to their safe stowage, handling and carriage on special purpose ships. The IMDG Code also contains requirements for electrical equipment, wiring, fire-fighting equipment, ventilation, smoking provisions and requirements for any special equipment. Some of the provisions are general and apply to all classes of dangerous goods, whilst others are specific, e.g., Class 1 Explosives.

7.3 Therefore, it is important to take into account the appropriate provisions of the IMDG Code when planning to carry dangerous goods, so that the relevant provisions can be taken into account to ensure appropriate construction, loading, stowage, segregation and carriage provisions are put in place.

7.4 Although the IMDG Code does not apply to ship's stores, the master and persons on board the ship responsible for the use of ship's stores shall be aware of the provisions of the IMDG Code and shall apply them as best practice whenever possible.

7.5 The issues of stowage, personal protection and emergency procedures when dangerous goods are in use, and the subsequent stowage of opened dangerous goods, shall be addressed through a formal safety assessment. In addition to the IMDG Code, to carry out such a formal safety assessment, suppliers and safety data sheets for the dangerous goods shall also be consulted.

7.6 The provisions of the IMDG Code are based on intact and unopened packaging and the removal of explosive articles or substances from a complete pack may invalidate its IMDG Code classification. This aspect shall be taken into account when carrying out the formal safety assessment to ensure an equivalent level of safety is maintained when dangerous goods remain after use.

8 LIFE-SAVING APPLIANCES

8.1 The requirements of Chapter III of SOLAS shall be applied with the specifications given hereunder.

8.2 A special purpose ship carrying more than 60 persons on board shall comply with the requirements contained in Chapter III of SOLAS for passenger ships engaged in international voyages which are not short international voyages.

8.3 Notwithstanding the provisions of 8.2, a sail training ship carrying more than 60 persons on board may in lieu of meeting the requirements of regulations 21.1.1 of Chapter III of SOLAS comply with the requirements of regulation 21.1.5 of Chapter III of SOLAS, including the provision of at least two rescue boat(s) in accordance with regulation 21.2.1 of Chapter III.

8.4 A special purpose ship carrying not more than 60 persons on board shall comply with the requirements contained in Chapter III of SOLAS for cargo ships other than tankers. Such ships may, however, carry life-saving appliances in accordance with 8.2, if they comply with the subdivision requirements for ships carrying more than 60 persons.

8.5 Regulations 2, 19.2.3, 21.1.2, 21.1.3, 31.1.6 and 31.1.7 of Chapter III of SOLAS and the requirements of paragraphs 4.8 and 4.9 of the LSA Code are not applicable to special purpose ships.

8.6 Where in Chapter III of SOLAS the term "passenger" is used, it shall be read to mean "special personnel" for the purpose of this Code.

9 RADIOCOMMUNICATIONS

9.1 Notwithstanding the right of the Flag State Administration to impose requirements higher than those specified herein, special purpose ships should comply with the requirements for cargo ships of Chapter IV of SOLAS.

10 SAFETY OF NAVIGATION

10.1 All special purpose ships shall comply with the requirements of Chapter V of SOLAS.

11 SECURITY

11.1 All special purpose ships shall comply with the requirements of Chapter XI-2 of SOLAS.

13. REGULATIONS FOR IMPLEMENTATION AND MAINTENANCE OF SHAFTING CONDITION MONITORING SYSTEM

1 GENERAL

1.1 The Regulations for implementation and maintenance of shafting condition monitoring system (hereinafter referred to as the Regulations) shall apply onboard the ships equipped with closed loop lubrication of the stern tube using oil or fresh water as a cooling liquid under technical supervision of the Register.

The Regulations take into account IACS UR Z21:
requirements to implementation and maintenance of the documented shafting condition monitoring system;

recommendations to oil analysis;
recommendations to fresh water analysis.

2 REQUIREMENTS

2.1 Requirements to implementation and maintenance of the documented shafting condition monitoring system.

2.2 These requirements are applicable to all ships equipped with closed-loop lubrication of the stern tube using oil or fresh water as a cooling liquid as a precondition of the shafting survey using Method 2 and Method 3 according to 2.10.2.7 and 2.10.2.8 of Part II "Survey Schedule and Scope" of the Rules.

2.3 Shafting survey using Method 2 and Method 3 is possible only if the shipowner has implemented and maintained the documented shafting condition monitoring system (hereinafter referred to as the SCM system) on board the ship meeting the requirements of the Regulations.

2.4 Propeller shaft condition monitoring (PCM) system, if implemented on board earlier and duly maintained, is considered equivalent to the SCM and sufficient for the shafting survey using Methods 2 and 3.

2.5 The shipowner shall timely implement and further maintain the SCM system, which will be recognized in the course of shafting survey provided that:

the SCM system shall be implemented by the shipowner during, or within 12 months after its completion using Method 1 shafting survey (i.e. the normal survey). The system implemented later shall be considered by RHO;

The SCM system shall be duly maintained by the shipowner so as the RS Surveyor could verify its effectiveness by documentation during the next nearest periodical survey;

the SCM system shall be duly maintained by the shipowner so as the RS Surveyor could, at subsequent shafting surveys by any method, verify its effectiveness and use it for surveying.

2.6 The shipowner and the crew shall be completely responsible for implementation and further maintenance of the SCM system as well as for reliability of information submitted to the RS Surveyor.

2.7 Implementation procedure for the SCM system when submitting shafting for the survey using Method 1 (refer to 2.4).

2.7.1 Implementation of the SCM system on board the ship shall be launched by the shipowner in the form of an order or an instruction where, among other matters, a person (Chief Engineer) responsible for the system maintenance is assigned. The order/instruction copy shall be kept on board the ship.

2.7.2 The system shall be documented in the hard (paper) form, in electronic data storage or on the onboard personal computer.

2.7.3 The system shall at least cover the issues specified in 2.10.

2.7.4 The shipowner shall notify the RS Branch Office carrying out the survey on implementation of the SCM system onboard the ship in writing.

2.7.5 The RS Surveyor carrying out survey of the ship/shafting shall review the SCM system implementation documentation for complete coverage of issues specified in 2.10 and check implementation of the system on board the ship. The review and check results shall be issued by a report (Form 6.3.10) with a brief description of the system in place and its compliance with the requirements specified in 2.10.

2.7.6 Upon satisfactory results of the documentation review and checking the system implementation on board the ship, the RS Surveyor enters the following additional information to the Classification Section in the List of Survey's Status:

"xx.xx.xxxx (date) the shipowner has implemented the documented shafting condition monitoring (SCM) system. The SCM system is submitted to the Register with satisfactory results. Refer to Report No. xx.xxxxx.xxx dated xx.xx.xxxx (number and date of the Report (Form 6.3.10))."

2.7.7 Upon unsatisfactory results of the documentation review and/or check of the system implementation on board the ship, the RS Surveyor shall specify all the nonconformities in the Report.

2.8 Implementation procedure for the SCM system after submitting shafting for the survey by Method 1 (refer to 2.5).

2.8.1 Implementation of the SCM system on board the ship shall be launched by the shipowner in the form of an order or an instruction where, among other matters, a person (Chief Engineer) responsible for the SCM system maintenance is assigned. The order/instruction copy shall be kept on board the ship.

2.8.2 The SCM system shall be documented in the hard (paper) form, in electronic data storage or on the onboard personal computer.

2.8.3 The SCM system shall at least cover the issues specified in 2.11.

2.8.4 The shipowner shall notify the RS Branch Office for in-service supervision on implementation of the SCM system on board the ship in writing.

2.8.5 Upon received application, the RS Branch Office for in-service supervision shall enter the following additional information to the Classification Section in the List of Survey's Status:

"xx.xx.xxxx the shipowner declares his intention to implement the shafting condition monitoring (SCM) system on board the ship (refer to document No.... dated xx.xx.xxxx by "Thesis" System). During the next shafting survey the RS Surveyor shall review the respective documentation and check implementation of the SCM system on board the ship".

2.8.6 During the next shafting survey, the RS Surveyor carrying out the survey shall first review documentation on implementation of the SCM system on board the ship and check the system implementation in compliance with 2.7.5 to 2.7.7.

2.9 Implementation procedure for the SCM system in the presence of the maintained propeller shaft condition monitoring (PCM) system.

2.9.1 If the PCM system has been implemented according to the previously applicable RS rules (to be confirmed by the information in the List of Survey's Status) and is maintained on board the ship, the shipowner shall not declare his intention on its further maintenance.

2.9.2 During the next shafting survey, the RS Surveyor carrying out the survey shall first review compliance of the documentation on the PCM system on board the ship with the Regulations and check the system implementation according to 2.6.5 to 2.6.7.

2.10 Later, maintenance of the SCM system shall be checked by the RS Surveyor on board the ship during each shafting survey carried out using any method. The efficiency and maintaining of the implemented system shall be confirmed in the accounting reports upon shafting survey (refer to Check list (Form 6.1.01) or Report (Form 6.3.17)).

If the RS Surveyor finds out that the implemented SCM system is not duly maintained or it shall be considered inefficient, Methods 2 and 3 cannot be used for shafting survey and the shafting shall be submitted to normal survey using Method 1.

2.11 Requirements to SCM system.

Irrespective of the type and method of the SCM system implementation on board the ship, the information specified in 2.11.1 to 2.11.5 shall be collected, analyzed and stored (depending on the cooling liquid type).

The information shall be stored on board the ship and shall be available for the RS Surveyor.

2.11.1 Technical data to be collected, analyzed and stored:

.1 data according to the results of the last shafting survey by the Register:

stern and bow bearing clearances;

shaft dropping value¹;

flaw detection results of the shafting component.

2.11.2 Information on shafting operation (at least for one year):

oil temperature at bearing outlet;

metal temperature of the forward bearing;

metal temperature of the aft bearing;

consumption of oil from the bearing lubrication system (amount of additions);

Oil/water renewal (number).

2.11.3 The results of the stern tube bearing cooling liquid laboratory analysis (the recommended procedure is given in Sections 3 and 4 of the Regulations).

2.11.4 The results of the stern tube bearing vibration control as an additional parameter of the stern tube bearing condition monitoring.

2.11.5 Data on the scope and results of all works carried out on maintenance and repair of the shafting and stern gear part replacement.

3 RECOMMENDED PROCEDURE FOR OIL ANALYSIS

3.1 This procedure describes the procedure for determining metal and other particle content in oil used as a stern gear cooling liquid and developed according to the provisions of the IACS Recommendation No.36 "Recommended procedure for the determination of contents of metals and other contaminants in stern tube lubricating oil".

3.2 The analysis shall be carried out by a laboratory recognized by the Register or another classification society (ACS) – IACS member.

3.3 Each analysis carried out using a respective method shall comprise at least the following parameters:

3.3.1 Water contents:

Water contents shall not exceed 1 per cent.

3.3.2 Chloride contents in water (in case of detecting water in oil): chloride contents in water shall not exceed 70 ppm.

3.3.3 Particle contents of the following metals:

Chromium;

Copper;

Iron;

Lead;

Nickel;

Silicon;

Tin.

¹The propeller (tube) sagging shall be determined by difference in the values of two measurements made during the period of monitoring. The value of the total sagging for the stern tube bearings period of operation shall not exceed the values set in the manufacturer's documentation. The measurements shall be made using a measuring instrument (sagging meter) through a special opening in the aft seal of the stern tube arrangement.

3.3.4 Due to possible ingress of sea water, presence of the following metals shall be specified:

Magnesium;

Sodium.

3.3.5 The contents of metals specified in 3.3.3 and 3.3.4 shall be evaluated considering the type of the used stern tube seal and chemical composition of the bearing material.

3.3.6 Permissible values of the parameters:

Parameter (metal)	Permissible value (ppm)
Chromium (Cr)	10
Copper (Cu)	50
Iron (Fe)	30
Lead (Pb)	10
Nickel (Ni)	10
Silicon (Si)	40
Tin (Sn)	10
Magnesium (Mg)	30
Sodium (Na)	80

Several analyses shall be carried out on board the ship consequently to evaluate the current data in order to monitor these parameters variation trends.

3.4 One of the most important parameters of lubricating oil condition is its oxidation value, which shows oil aging. Increase of this parameter indicates possible bearing overheat or overpollution of oil with corrosion products. Oil oxidation value is expressed through the total acid number (TAN) parameter, which depends on the used oil type and is specified by the manufacturer.

The conclusions on oil aging shall be made on the basis of consecutive analyses.

3.5 Sampling conditions:

samples shall be taken according to the stern gear operating instructions;

samples shall be taken with propeller shaft rotating at nearly nominal RPM and at the operating temperature;

samples shall be taken from the lubrication system position specified in the agreed SCM system documentation;

if sampling coincides with the shafting survey, the sample shall be taken in the presence of the RS Surveyor. In all other cases, samples shall be taken in the presence of the Chief Engineer.

3.6 In addition to the above, it is recommended to carry out analysis of the particles detected in oil in order to determine their origin and material.

4 RECOMMENDED PROCEDURE FOR FRESH WATER ANALYSIS

4.1 This procedure describes the procedure for determining metal and other particle content in fresh water used as a stern gear cooling liquid and developed according to the provisions of IACS recommendation No.143 "Recommended procedure for the determination of contents of metals and other contaminants in a closed fresh water system lubricated stern tube".

4.2 The analysis shall be carried out by a laboratory having at least state accreditation.

4.3 Each analysis carried out using a respective method shall comprise at least the following parameters:

4.3.1 Particle and corrosion product content for the following metals:

Iron;

Chromium;

Nickel;

Copper;

Silicon.

The content of the specified metals shall be evaluated considering chemical composition of the shaft, liner and stern bearing material.

Permissible values of the parameters:

Parameter (metal)	Permissible value (ppm)
Iron (Fe)	25
Chromium (Cr)	5
Nickel (Ni)	5
Copper (Cu)	40
Silicon (Si)	30

Several analyses shall be carried out on board the ship consequently to evaluate the current data in order to monitor these parameters variation trends.

4.3.2 Presence of corrosion inhibitors (pH or equivalent acidity parameter) indicating corrosion prevention system's capacity to passivation, i.e. oxide film formation.

Fresh water used in the lubrication system may contain, if so specified by the system manufacturer, corrosion inhibitors, which limit the shaft and/or liner corrosion risk. The inhibitor properties and content may differ, so no recommended values are specified here

The only parameter which may be used as the main parameter is the pH value or an equivalent acidity parameter. The low limit of the pH value is set equal to 11.

4.3.3 Water salinity parameters or equivalent parameters, i.e. total conductance, in order to evaluate possible mixing of the lubricating fresh water with sea water (e.g., in case of seal leakage), i.e. content of:

Chlorides;

Sodium.

Permissible values of the water salinity:

Water salinity parameter	Permissible value (ppm)
Chlorides	60
Sodium (Na)	70

4.3.4 Bearing particle content.

Bearings used in the shafting with fresh water lubrication system can be made of synthetic materials and have a composite structure comprising specially selected polymers and additives of mineral or synthetic origin.

Presence of synthetic materials in fresh water may indicate that the bearing is worn its destruction process is started.

Fresh water sample mechanical filtering, e.g. with paper microfilter, enables quantitative analysis of the macroscopic particle content. In this case the sample shall be taken before the filters if they are installed in the system.

The particle analysis with the microscope is recommended to detect presence of non metal bearing particles in the sample.

4.4 Sampling conditions:

samples shall be taken according to the stern gear operating instructions;

samples shall be taken with propeller shaft rotating at nearly nominal RPM and at the operating temperature;

samples shall be taken from the lubrication system position specified in the agreed SCM system documentation. Water circulating inside the stern gear shall be used for sampling;

if sampling coincides with the shafting survey, sample shall be taken in the presence of the RS Surveyor. In all other cases, samples shall be taken in the presence of the chief engineer.

14. REPORTING TO LOSING SOCIETY**№-1A Harmonisation of Reporting**

ITEM	ACTION	LOCATION	DATE	GAINING SOCIETY'S REPORT REQUIREMENTS
Overdue Survey	Commenced	Port	Survey Date	List items credited and items remaining to be credited, if any. Explain why the entire survey was not completed at this port. List conditions for direct voyage to port where survey will be completed, including the need to discharge current cargo if applicable
Overdue Survey	Continued	Port	Survey Date	In cases where surveys are continued at the port where the current cargo is discharged, list items credited and items remaining to be credited, if any. Explain why the entire survey was not completed at this port. List conditions for direct voyage to port where survey will be completed
Overdue Survey	Completed	Port	Survey Date	List place and date where survey was completed
Overdue Recommendation, or condition of class	Cleared	Port	Survey Date	Explain actions taken to complete overdue recommendation as specified by losing Society
Overdue Recommendation, or condition of class	Commenced	Port	Survey Date	In cases where overdue Recommendations/or conditions of class are postponed or partly postponed at the port where the current cargo is discharged, list items credited and items remaining to be credited, if any. Explain why the overdue recommendation was not completed at this port. List conditions for discharge voyage to port where recommendation will be complete as specified by losing Society.
Overdue Recommendation, or condition of class	Cleared	Port	Survey Date	List date, place and actions taken for completion of overdue recommendations/or conditions of class

15. PROCEDURE FOR ANNUAL SURVEY OF THE GMDSS RADIO EQUIPMENT

1 GENERAL

1.1 The Procedure is intended for annual survey of the GMDSS radio equipment on board ships in service carried out.

1.2 Demonstration of efficiency of the GMDSS radio equipment during annual survey shall be performed by persons possessing appropriate certificates – ship crewmembers. In specific cases, representatives of Shipowners possessing appropriate certificates or shore-based maintenance enterprises may be involved for this purpose.

1.3 The procedure for annual survey of radio equipment consists of stages listed in 1.3.1 to 1.3.5.

1.3.1 Check of documentation and list of radio equipment includes:

check for availability of the Cargo Ship Safety Radio Certificate (Form 2.1.12 or 2.1.12.2) and of the Record of Equipment (Form 2.1.20);

check for agreement of the product serial number with the number indicated in the Report on Radio Equipment Initial/Special/Annual Survey (Form 6.3.28), for availability of Register type approval for the product or other document required by the Administration of the ship Flag State and confirming that the radio equipment installed complies with the requirements of Part IV "Radio Equipment" of the Rules for the Equipment of Sea-Going Ships and that these requirements are not inferior than those adopted by the International Maritime Organization (IMO);

revealing of alterations in the list of radio equipment as compared to the preceding survey, availability of the Register certificate for stock-produced article and check for agreement of the product serial number with the number stated in the certificate and technical documentation for newly installed radio equipment, availability of Register type approval for the product or of other document required by the Administration of the Ship Flag State and confirming that the radio equipment installed complies with the requirements of the above Rules and that they are not inferior than those adopted by IMO;

check for availability on board ship of a valid license for the ship's radio station issued by the Administration of the ship Flag State with indication of the call sign and ship identity (MMSI), date of its issue and duration;

check for availability of the number of radio officers on board as required by the Administration of the ship Flag State and qualification thereof (availability of the appropriate certificates of the GMDSS operators (radioelectronicians));

check for availability and proper keeping of the radio log;

check for availability of the actual publications of the International Electric Communication Union and the renewal terms:

List of Coast Stations (List IV) – once a year;

List of Ship Stations (List V) – once a year;

check for availability on board ship of an agreement for shore maintenance concluded with the Manufacturer of the GMDSS radio equipment or with an enterprise authorized by the Manufacturer to do so, possessing the certificate of recognition by the Register (if efficiency of the equipment is ensured by shore maintenance and repair);

check of appointment of the persons responsible for radio communication during distress, for delivery and use of emergency radio communication facilities used in life-saving appliances in case of ship accident;

check of tools, spare parts and testing equipment according to the list approved by the Register;

check for availability on board of the operating instructions for the entire radio equipment.

1.3.2 Examination of spaces in which the GMDSS equipment is located includes:

check for availability of clocks, diagrams indicating procedures for ships reply to the DSC distress signals, plates with the ship's name, call sign, ship identity (MMSI), INMARSAT ship earth station

numerical identity, radio telex terminal number located in conspicuous position in the immediate vicinity of the radio communication equipment controls;

check of positioning and fastening of sets, power supply switchboards and charging devices, accumulator batteries of the radio equipment;

check of the installation work quality, condition of the cable system, earthing, ventilation, lighting (including that from the reserve electric power source);

check for providing space, radio installation controls with lighting;

check for providing with heating and ventilation.

1.3.3 External examination of the radio equipment consists of control over appropriate notes on checks and validity periods for those kinds of equipment for which check shall be carried out by competent authorities having the Register recognition certificates, in special laboratories.

1.3.4 Check of functioning and efficiency of the radio equipment includes:

check in operation with the use of a built-in control systems (operating instructions and recommendations of the equipment Manufacturers are used);

check in operation from the operator's working place;

check in operation of the remote control station;

check in operation from the main and reserve electric power sources, including check of the switching signalling, check for lack of need for manual re-starting and for loss of messages stored in the memory of the INMARSAT ship earth stations during switching;

check for efficiency when power supplied from accumulator batteries or galvanic cells built in the radio equipment.

2 EXTERNAL EXAMINATION DURING CHECK OF THE SHIP'S RADIO COMMUNICATION FACILITIES

2.1 The external examination of the radio equipment shall include the following procedures:

visual examination of the external parts of the ship's radio communication facilities, earthing arrangements, cable shields;

check of condition of the controls and alarm devices on the front panels of the radio equipment;

check for smooth movement and proper fixing of the controls. When turning the tuning knobs in both senses, there shall not be tight jerky movement or free movement without feeling of friction braking. When turning the tuning knobs there shall not be slippage (play);

whenever necessary, internal examination of the equipment (subject to check are to be the condition of the internal wiring, resistors, electrolytic capacitors, panels, plug-and-sockets, terminal connections, etc.). Attention shall be paid to the lack of burnt resistors, panels and to the dribbling of the electrolytic capacitors;

check of the condition of the aerials (it is necessary to carry out external examination of the high-frequency feeder and aerials). The structure and wiring shall have no mechanical damages. During examination, attention shall be paid to the condition of the halyards, guys, stranded wire blocks and safety loop, to cleanliness and absence of chipping and cracks in the insulators. When examining rod aerials, attention shall be paid to the condition of the support insulators, quality of painting;

check for the efficiency of connecting the precaution shield of the aerial leads-in with the ship's hull;

check of the wire aerial sag (if any) which shall not exceed 6 per cent of the aerial span. The distance between the ship's aerials and metal parts of the ship shall not be less than 1 m. In ships provided with metal braces, the horizontal wires of the aerial shall be at least 3 m distant therefrom;

check of the cell jars and shelves of the accumulator batteries for cleanliness (freedom of rust), freedom of oxides on the terminal connections. The contacts of the accumulator batteries shall be tightened up.

3 PROCEDURE FOR ANNUAL SURVEY OF THE RADAR TRANSPONDER

3.1 If the zone of activity of the Branch Office includes enterprises recognized by the Register for checking the radar transponder, checks shall be carried out on the premises of these enterprises.

The annual survey includes review of the documentation on performance of the compulsory periodical checks, external examination and check of the radar transponder in operation. Compulsory periodical checks shall be carried out not less than once every 12 months.

3.2 Procedure for check of the technical condition and operability of the radar transponder.

3.2.1 The review of the documentation on the radar transponder consists of:

- .1** review of the documentation as required in 1.3.1;
- .2** examination of the entry in the ship's file or report on check of the radar transponder by an enterprise recognized by the Register;
- .3** check of the expiry date for storage of the primary battery used. The period of storage of the primary battery shall be not less than two years. The primary batteries shall be replaced if the period of their storage left is less than 12 months. Date of manufacture and maximum period of storage shall be indicated on the batteries.

3.2.2 The external examination consists of:

- .1** check of the location of the radar transponder and for availability of the IMO symbol "Radar transponder", as well as for the possibility of free access to the radar transponder;
- .2** check for the integrity of the hull, quality of painting and freedom from mechanical damages;
- .3** check for the availability of means to prevent inadvertent activation of the radar transponder;
- .4** check for the availability and fastening of the buoyant line suitable for use as a tow line if the radar transponder is not an integral part of the survival craft;
- .5** check for the availability and condition of brief operating manual indicated on the exterior of the radar transponder;
- .6** check for the availability of the date of the next replacement of the primary batteries, marked on the instruction plate and the radar transponder;
- .7** check for the availability of a pole or other device for installation of the radar transponder in the survival craft at a height of at least 1 m above the sea level.

3.2.3 Check of the radar transponder for operability consists of checking the radar transponder in self-monitoring mode as well as its checking with the use of the radar operating in the 3 cm range.

3.2.3.1 To check the radar transponder for operability it is necessary:

- .1** using the operating manual indicated on the exterior of the radar transponder to force the radar transponder in the check mode.

The indicator of operability of the radar transponder in the check mode: visual and/or audible alarm shall be actuated depending on the design features of a particular type of the radar transponder. The characteristics of the alarm are defined in the technical description of the product;

- .2** to deactivate the radar transponder using the operating manual.

3.2.3.2 In order to check the radar transponder for operability with the use of the navigational radar operating in the 3 cm range (check may be omitted if there is a document on the check of the radar transponder by a competent authority having the Register recognition certificate), it is necessary:

- .1** for checking the range to ensure a distance up to 5 nautical miles between the radar transponder and the radar. Check may be carried out on board ship if the radar transponder is located within the radar aerial polar diagram zone (e.g. on the bridge wing). During the test, the radar transponder shall be held vertically above the head;
- .2** to activate the radar and radar transponder.

The indicator of operability of the radar transponder: replies from the radar transponder are displayed on the radar in the form of 12 points (arcs). If the number of points is not equal to 12, then in order to obtain all the 12 replies it is necessary to change over to the large range scale of the radar display;

- .3** deactivate the radar transponder and the radar.

ATTENTION! Check shall be limited to a few seconds to avoid harmful interference to other shipborne or airborne radars and excessive consumption of source of power.

3.2.3.3 For comprehensive check of the radar transponder for operability on board ship, portable instrumentation sets approved by the Register may be used.

4 PROCEDURE FOR ANNUAL SURVEY OF THE COSPAS-SARSAT EMERGENCY POSITION-INDICATING RADIO BEACON (EPIRB-406)

4.1 If the zone of activity of the Branch Office includes enterprises recognized by the Register for checking the EPIRB-406, checks shall be carried out on the premises of these enterprises.

The annual survey includes review of the documentation and notes on performance of the compulsory periodical checks by a competent authority having the Register recognition certificate, external examination and check in operation without emitting signals on the air.

4.2 Procedure for checking technical condition and operability of the EPIRB-406.

4.2.1 Review of the documentation consists of:

.1 review of the documentation in accordance with 1.3.1;
.2 check for availability of documents on registration of the EPIRB-406 in the Marine Coordinating Computation Centre (e.g. telegram of reply from the Marine Coordinating Computation Centre with an acknowledgement of the RPIRB-406 registration);

.3 examination of the entry in the product's file or report on the last check of the EPIRB-406 on the premises of an enterprise recognized by the Register. The check of the EPIRB with measurement of the main parameters shall be carried out by competent authorities having the Register recognition certificate and not less than once in a year; check of the devices for automatic release of float-free satellite EPIRB – not less than once every two years.

Check for the Report on the EPIRB final shore-based maintenance. The check of the EPIRB shore-based maintenance shall be carried out by the competent authorities having the Register recognition Certificate within the periods not exceeding 5 years;

.4 examination of the entry in the product's file or report on the date of replacement of the primary batteries by an enterprise recognized by the Register maximum period of storage shall be indicated on the batteries and the cells;

.5 performance checks to align with the appropriate survey under the Harmonized System of Survey and Certification (HSSC). The annual performance check of EPIRB- 406 may be carried out up to 3 months before the due date for a passenger ship and within 3 before or after the due date but not later than the date of completion of the survey of radio equipment for a cargo ship. (The maximum period between subsequent checks is, therefore, 15 months for passenger ships and 18 months for cargo ships, unless either certificate (Passenger Ship Safety Certificate or Cargo Ship Safety Radio Certificate) has been extended as permitted by SOLAS-74/78, regulation I/14, in which case a similar extension may be granted).

4.2.2 The external examination consists of:

.1 check of the location of the EPIRB-406 and for availability of the IMO symbol "Emergency position-indicating radio beacon", as well as for the possibility of free access to the EPIRB;

.2 check for the integrity of the hull, quality of painting and freedom from mechanical damages;

.3 check for the availability of means to prevent inadvertent activation of the EPIRB-406;

.4 check for the availability and fastening of the buoyant line suitable for use as a tow line;

.5 check for the availability and condition of brief operating manual on the exterior of the EPIRB;

.6 check for the availability of the date of the next replacement of the primary batteries, date of the next check or replacement of the device for automatic release of the free-float EPIRB-406, marked on the exterior of the EPIRB (instruction plate);

.7 check for the availability of an identity code indicated on the exterior of the EPIRB-406;

.8 check for the availability of the retroreflecting material (band) on the exterior of the EPIRB-406.

4.2.3 Check of the EPIRB-406 for operability:

to check the EPIRB-406 for operability in self-monitoring mode and then, using the operating manual, to force the EPIRB in the check mode.

The indicator of the EPIRB operability in the check mode: visual signalling – flashing of the indicating lamp. The flashing mode depends on the design features of a particular type of the EPIRB; the characteristics of signaling are defined in the technical description of the product.

4.2.4 For comprehensive check of EPIRB for operability on board ship, portable instrumentation sets approved by the Register may be used.

4.2.5 After the said check it is necessary to control the correctness of EPIRB mounting on its standard bracket to ensure that the transmission is not started.

5 PROCEDURE FOR ANNUAL SURVEY OF THE NAVTEX RECEIVER

5.1 The annual survey includes external examination and check for proper functioning of the receiver, signal processing device and printer.

5.2 Procedure for checking the technical condition and operability of the NAVTEX receiver.

5.2.1 External examination.

To carry out external examination in accordance with Section 2.

5.2.2 Check of the receiver for operability:

.1 to activate the NAVTEX receiver. The self-monitoring mode is turned on automatically. The indicator of the receiver operability is to be determined in accordance with the operating manual;

.2 where a loudspeaker is built in the receiver, to switch on the built-in loudspeaker and listen to the receiver through the loudspeaker. The indicator of the receiver operability: noise or signal is heard in the loudspeaker;

.3 to check the printer for operability in the self-monitoring mode. To select the printer test mode. The indicator of the printer operability: the printer shall print a set of alphabet characters;

.4 to check the paper feed mechanism for operability. The indicator of the operability: paper feed shall take place;

.5 to check operation of the brightness control;

.6 to check the list of the stations selected. The list shall contain at least one station in each area wherein the messages of the NAVTEX service are transmitted. (Position of the stations and time table for operation are given, for example, in GMDSS Master Plan IMO, Annex 7. These publications are regularly updated);

.7 to check the performance of the software. Using the operating manual, to check the software. The indicator of the performance: printout or display of the check results;

.8 to check the built-in battery for operability. To take the paper out of the printer. To tune the receiver for reception of all stations. Upon receiving the messages and storing them in the NAVTEX receiver to turn off the power supply for 5 to 10 min. To put the paper into the printer. To turn on power supply. The indicator of the operability: the printer shall print out the message stored in the memory of the equipment.

6 PROCEDURE FOR ANNUAL SURVEY OF THE TWO-WAY VHF RADIOTELEPHONE APPARATUS

6.1 The annual survey includes review of the documentation and notes about performance of the compulsory periodical checks by an appropriate competent authority, external examination and check in operation.

6.2 The procedure for check of the technical condition and operability of the two VHF-way radiotelephone apparatus.

6.2.1 The review of the documentation consists of:

.1 review of the documentation in accordance with 1.3.1 (in tankers, oil/ore carriers, oil/bulk dry cargo carriers, gas carriers, chemical tankers subject to check is to be intrinsically safe design of the apparatus confirmed by the laboratories recognized by the Register);

.2 check of the location of the two-way VHF radiotelephone apparatus and for availability of the IMO symbol "Radio station for survival craft";

6.2.2 The external examination consists of:

.1 check for the hull integrity and for the provisions for attachment to the clothing of the user;

.2 check for the availability of the operating manual on the exterior of the apparatus;

.3 check for the condition of painting (the apparatus shall be painted either in the bright yellow/ orange colour or have a marking strip of bright yellow/orange colour around the apparatus);

.4 check for the availability of the dedicated primary batteries for use in case of distress if the apparatus are intended for use with a source of power to be replaced by the user. Such primary batteries shall have the storage period of at least two years and be so designed that it can be seen that they have not been used, and shall be painted or marked in accordance with 6.2.2.3. Expiry date of the primary batteries shall be indicated on the exterior of the batteries.

The VHF apparatus, in which a replacement of the source of power is not needed during operation, shall be provided with a primary battery. In this case, the two-way VHF radiotelephone apparatus shall be so designed that it can be seen that the apparatus have not been in operation;

.5 check for the availability of the expiry date for the primary batteries indicated on the exterior of the apparatus;

.6 check of the charging devices in operation, if rechargeable batteries are used.

6.2.3 To check the operability it is necessary:

.1 to switch on the apparatus. The indicator of the operability: light indication of activation;

.2 to check the volume control for operability. The indicator of the operability: change of loudness level;

.3 to check the mute control for operability. The indicator of the operability: when the noise suppression level is changed, a jump in the noise level shall be heard;

.4 to check the channel selection switch for operability, the possibility of selecting "rapidly" the channel 16. The indicator of the operability: upon activating the apparatus, the latter shall be tuned automatically to the channel 16, and the switching to the channel 16 of the apparatus in operation shall be effected by a single action: by pressing the pushbutton "16";

.5 to check the power reduction mode for efficiency (to 1 W or less) and the indication of the power reduction mode;

.6 to check the VHF apparatus for operability in the control communication mode. The apparatus shall be capable of operation on the channel 16 and on at least one additional channel. To switch on two radio stations and establish communication within the ship in the simplex mode; to select an another channel on the radio stations in order to reveal inoperative channels for reception and transmission. In case of control communication, the power reduction mode shall be used;

.7 to check the accumulator batteries for the operability. When the check is made by the control radio communication method, attention shall be paid to the battery discharge indicator (if any): the light/sound indication suggests that the battery capacity has decreased.

7 PROCEDURE FOR ANNUAL SURVEY OF THE INMARSAT SHIP EARTH STATION

7.1 The annual survey includes the external examination and check in operation.

7.2 The procedure for check of the technical condition and operability of the INMARSAT ship earth station.

7.2.1 The external examination.

To carry out the external examination in conformity with Section 2.

7.2.2 The check of the INMARSAT-C ship earth station consists of:

.1 check of the station for operability and the information received for fidelity in the communication line "annular check" mode, when control message is transmitted. It is necessary to prepare a control message: to compose a message in the text field, using the operating manual. To entry the addresses of the

message receiver, selecting own station as the called station. Using the surveyed ship identity, to entry it into the address book. To select the "Routine" transmission mode. To transmit the control message. The indicator of the operability: reception of the message transmitted in, approximately, 5 min. To check the received information for fidelity by comparing the transmitted message with the received one;

.2 check of the station for the operability and the received information for fidelity in the enhanced group calling (EGC) mode by means of review of the message in the electronic journal in accordance with the operating manual. It is necessary to select the nearest scheduled time for transmission of the NAVAREA messages (time-table of transmissions is given, for example, in Inmarsat Safety Net Handbook; Admiralty List of Radio Signals, vol. 5; GMDSS Master Plan IMO, Annex 8). To programme the EGC receiver in accordance with the operating manual. The indicator of the operability: reception of the NAVAREA messages. To review the received maritime safety messages available in the EGC electronic journal, using the operating manual;

.3 check for the possibility of initiating and making distress alerts from the position from which the ship is normally navigated and also from any other position designated for initiating of distress alerts;

.4 check for any interruption of the supply of electrical power up to 60 s shall not require the equipment to be manually reactivated or cause the loss of the received messages stored in the memory;

.5 check of the station for operability when supplied by the reserve source of power. It is necessary to switch off the main (emergency) source of power. The indicator of the operability: when the station is supplied from the accumulator battery, the results of the operability checks shall be the same as indicated in 7.2.2.1 to 7.2.2.2.

7.2.3 The check of ship security alert system consists of:

.1 dispatching a text message;

.2 check for receiving of the text message by the addressee, authorized by the Administration of the ship Flag State.

8 PROCEDURE FOR ANNUAL SURVEY OF THE COMMAND BROADCAST APPARATUS

8.1 The annual survey includes external examination and check of the apparatus in operation.

8.2 The procedure for check of the technical condition and operability of the command broadcast apparatus.

8.2.1 The external examination consists of examination of the main command microphone post in the ship command broadcasting centre and, as a minimum, two microphone posts located on the bridge and in the room intended for keeping watch, remote loudspeakers, as well as examination of the interior wiring. Unpainted threaded connections shall be clean and smeared with a thin coat of the technical petrolatum. The microphone posts and commutator located on open deck shall be closed. When the command broadcast apparatus is combined with the general purpose broadcasting apparatus intended for transmitting general radio broadcasting and sound-recording programs, the loudspeakers installed in the accommodation spaces of the ship shall be fitted with volume controls.

8.2.2 The check for operability consists of:

.1 check of the command broadcast apparatus for operability. It is necessary to establish selective or conference communication of the wheelhouse with all posts, in any combination. The indicator of the operability: the volume level of command announcement in all service and public spaces, as well as on the open decks shall exceed the noise level by at least 20 dB, that is a normal articulation shall be ensured. When the command broadcast apparatus is combined with the broadcast apparatus intended for transmitting general radio broadcasting and sound recording programs it is necessary to check whether the priority of loud speaking and command broadcasting is provided;

.2 check of the possibility of controlling the command broadcast apparatus from any of the command microphone posts. The indicator of the operability: all kinds of control (switching on and off, commutation of the broadcasting relay lines, switching on a forcibly inserted broadcasting system) shall be carried out from any of the command microphone posts. A light signalling system shall be switched on

simultaneously with the starting of the command broadcast apparatus. Audio control of the quality of broadcast in each broadcasting line shall be carried out from the main command microphone post;

.3 check for the operability of the apparatus when supplied from the emergency temporary electric power source, if the latter is required. It is necessary to switch off the main (emergency) power source. The indicator of the operability: when the apparatus is supplied from the emergency temporary electric power source, the results of the checks for the operability shall be the same as indicated in 8.2.2.1 to 8.2.2.2.

9 PROCEDURE FOR ANNUAL SURVEY OF THE VHF RADIO INSTALLATION

9.1 The annual survey includes external examination and check in operation.

9.2 The procedure for check of the technical condition and operability of the VHF radio installation.

9.2.1 To carry out external examination of the VHF radio installation in conformity with Section 2.

9.2.2 To check the DSC encoder facility and the DSC watch keeping facility by a feedback loop: "DSC controller – transceiver – DSC watch receiver – DSC controller" using the operating manual.

9.2.3 To check the received information for fidelity by means of control over the operability of the VHF radio installation on the air in the selective call mode. For this purpose:

.1 to switch on the VHF radio installation with DSC;

.2 to entry, using the operating manual, in the following sequence: 9-digit numerical identity code of the called station (coast- or ship-based) → "Routine" call category → presumed operating channel;

.3 to transmit call on the channel 70. The indicator of the operability of the radio stations: the acknowledgement signal shall be received. If the ship is provided with a duplicating VHF radio installation check may be carried out by transmitting DSC call from one installation to another.

9.2.4 To review the ship's position information entered into the DSC facility. The indicator of the operability: the last entered ship's position information together with the time when this was entered shall be indicated on the display.

9.2.5 To review the numerical identities on the display: own 9-digit ship's numerical identity code and group identity codes if they have been entered into the radio installation.

9.2.6 To review the received messages on the display. The indicator of the operability: usual messages and distress messages (up to 20 messages with distress category) shall appear on the display.

9.2.7 To check for the operability of the VHF radio installation supplied from the reserve source of power. To switch off the main (emergency) source of power. The indicator of the operability: when the VHF radio installation is supplied from the accumulator battery, the results of the checks for operability shall be the same as indicated in 9.2.2 to 9.2.6.

10 PROCEDURE FOR ANNUAL SURVEY OF THE MF/HF RADIO INSTALLATION

10.1 The annual survey includes external examination and check in operation.

10.2 The procedure for check of the technical condition and operability of the MF/HF radio installation.

10.2.1 External examination.

To carry out external examination in accordance with Section 2.

10.2.2 Check of the installation for the operability:

.1 to switch on the radio installation. When the radio installation is switched on, the facility shall change to the reception mode;

.2 to check the display illuminating. The indicator of the operability: when the control pushbuttons are pressed the display illuminating level shall change;

.3 to check the following receiver controls for operability: switching on/off of the loudspeaker, volume control, automatic gain control (AGC), mute control (when checks are carried out with the loudspeaker

switched on the air noise shall be heard), frequency presetting and fine tuning to the frequency of the received signal. The check for the correct tuning of the receiver and for the possibility of fine-adjustment is recommended to be carried out in the real signal reception mode (e.g. standard time signals). Information on the station operation modes (geographic position of the station, frequency, structure of signals) may be obtained from ITU List of Coast Stations, Admiralty List of Radio Signals (e.g. the station in Moscow transmits the standard time signals on the frequencies 4,996 or 9,996 kHz);

.4 to check the following transmitter controls for operability: switching on of the aerial attenuator, emission mode – power level change (in this case, the selected power level is to be monitored using the readings of the power level indicator), setting of the distress traffic mode (on the frequency 2182 kHz). To check the aerial current using the current indicator (check shall be carried out on the frequency 2182 kHz or the frequency given in the operating instruction);

.5 to carry out internal check of the MF/HF DSC without emission of signals, using the operating manual. Subject to checking in this mode is the operability of the main units of the radio installation. The indicator of the operability: indication of the check results on the display unit;

.6 to check the coverage and fidelity of the received information with external check of the MF/HF radio installation for the operability through arrangement of a control communication session with the coast station. In order to check the coverage and fidelity of the received information when communication is established in HF range, to select a coast station which is 1000 nautical miles and more away from the ship out of the list of stations stored in the memory of the DSC controller or using the list of stations in ITU List of Stations, Admiralty List of Radio Signals. (For ships within the harbour waters of St. Petersburg, such station is, for example, the Lyngby Station, identification code: 002191000). To check the operability of the radio installation, coverage and fidelity of the received information in the DSC, radiotelephony and narrow band direct printing mode (only for the HF radio installation). In order to check the coverage, fidelity of the received information of the MF radio installation it is necessary to select a coast station which is up to 100 nautical miles away from the ship and originate a call on the DSC frequency in the MF range (2187,5 kHz). The information on the time-table for operation of the stations is contained, for example, in Admiralty List of Radio Signals, v. 5, Sea Area 2. For the harbour waters of St. Petersburg such station is, for example, the Station of Helsinki, identification code: 002301234;

.7 to check the operability of the MF/HF radio installation supplied from the reserve source of power. To switch off the main (emergency) source of power. The indicator of the operability: when the MF/HF radio installation is supplied from the accumulator battery, the results of the operability checks shall be the same as indicated in 10.2.2.2 to 10.2.2.6;

.8 to check the automatic device for generating the radiotelephone alarm signals on 2182 kHz in self-monitoring mode. To switch on the self-check mode in accordance with the operating manual. The indicator of the operability: audible alarm shall operate;

.9 to check the operability, coverage and fidelity of the received information of the HF direct-printing radiotelegraph receiver for reception of maritime safety information. To check the operability of the receiver, signal processing device, printer and means providing frequency retuning with the use of the internal self-monitoring system, if provided, using the operating manual. To check the preservation of the information on the areas covered by the service and on message categories stored in the equipment memory in the event of supply voltage failure during a period of up to 6 hours. To check the operability of the HF navigational information receiver in the maritime safety information reception mode, using the operating manual in conformity with the operation timetable of the radio stations. The information on the operation timetable of the radio stations of the maritime safety message transmission system is contained, for example, in GMDSS Master Plan (Annex IX). The messages may be received with the use of the shipboard HF direct-printing radiotelegraph receiver tuned to the frequencies 4210; 6314; 8416,5; 12579; 16806,5; 19680,5; 22376 and 26100 kHz in accordance with the operation time-table of the radio stations.

11 PROCEDURE FOR ANNUAL SURVEY OF THE CHARGING DEVICE AND THE RESERVE SOURCE OF ELECTRICAL POWER

11.1 The annual survey includes external examination and check in operation.

11.2 The procedure for check of the technical condition and operability of the charging device and the reserve source of electrical power.

11.2.1 External examination.

To carry out external examination in accordance with Section 2. If the accumulator batteries are unattended, to check the time when they are to be replaced. The equipment shall be installed in such a manner as to ensure free access to carry out examination and maintenance. The component parts of the equipment (including wires and cables) are to be so constructed and laid as to prevent them from accidental damage which presents a hazard. All casings of the equipment are to be provided with earthing terminals. The following information is to be clearly indicated on the exterior of the equipment units: details of the Manufacturer, serial number, type of equipment. It is necessary to check: the accumulator batteries for security of mounting, condition of the cabling, condition of the ventilation, heating and lighting in the accumulator battery room, availability of the operating manual for the accumulator batteries, availability of a warning notices on the door of the accumulator battery room, density and level of the electrolyte in the cell jars of the accumulator batteries, availability of the necessary amount of the electrolyte, distilled water, hydrometer, sounding tube, high-rate discharge tester and other inventory necessary for maintenance of the accumulator batteries, document confirming that the useful capacity of the accumulator batteries was checked with the use of the deep discharge method in port within the last 12 months by a competent authority having the Register recognition certificate.

11.2.2 Check of the operability:

.1 to switch off the main (emergency) source of power and connect the reserve source of power;

.2 to check the operability of the audible and visual signalling system for switching to a reserve source of electrical power at the position from which the ship is normally navigated. To switch off the main source of power from the GMDSS radio equipment console. The indicator of the operability: the audible and visual signalling system for switching to the reserve source of power shall operate. To switch off the audible signalling. To check whether the visual signalling remains (the visual signalling shall vanish only when the main source of power is connected);

.3 to check whether all the main equipment can be switched on and in proper working order;

.4 to check the voltage of the accumulator batteries by measuring it in conformity with the operating instruction for the accumulator batteries of the type concerned;

.5 to check the operation of the charging device. To put the battery on discharge through dummy load or to test it with the use of the high-rate discharge tester. After discharge, to put the charging device on automatic mode. The indicator of the operable condition: the charging device shall automatically be put on charge; whilst so doing, the current during charging shall not change (when the charging device is in floating service the charging current may change).

16. CIRCULAR LETTER OF IMO MARITIME SAFETY COMMITTEE

INTERNATIONAL MARITIME ORGANIZATION

4 ALBERT EMBANKMENT
LONDON SE1 7SR

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Circular letter No.2014
31 October 1997

Ref. T4/5.03
T1/2.08

To: All IMO Members
Contracting Governments to the International Convention on Load Lines, 1966
Contracting Governments to the International Convention for the Safety of Life
at Sea, 1974

Subject: **Supplements to the International Load Line Certificate (1966) and Cargo Ship
Safety Construction Certificate**

The Secretary-General has the honour to transmit herewith the text of the attached communication by the Government of the Russian Federation regarding the issue of Supplements to the aforementioned Load Line and SOLAS certificates.

The Secretary-General would be grateful if steps could be taken to bring this information to the attention of the appropriate authorities.

SUPPLEMENTS TO INTERNATIONAL LOAD LINE CERTIFICATES (1966) AND SUPPLEMENTS TO CARGO SHIP SAFETY CONSTRUCTION CERTIFICATES

This is to inform you that we have a large number of ships flying our flag for which all requirements of the Russian Maritime Administration to the general structural strength of the ship are complied with up to the draught corresponding to the freeboard assigned subject to the permanent operational restrictions.

Since the above-mentioned ships fully comply with all the applicable requirements of SOLAS (chapters II-1, II-2) and LL 66 International Conventions we consider that Cargo Ship Safety Construction and International Load Line Certificates (1966) may be issued in accordance with SOLAS Regulation 1/12(ii) and ICLL 66 article 16 and that there are no grounds to issue SOLAS Exemption and International Load Line Exemption Certificates.

For such ships the Russian Federation has issued Supplements to International Load Line Certificates (1966) and Supplements to Cargo Ship Safety Construction Certificates containing the assigned permanent restrictions.

The Forms of the above-mentioned Supplements are attached to this letter.

17. IMPOSING, CLEARING AND CONTROLLING ANY REGISTER REQUIREMENTS

1 GENERAL

1.1 Application.

The requirements of the Register are imposed with the aim to bring the technical condition of the ship, its supervised items into line with the requirements of the Register Rules.

The purpose of this document is to set unified procedures for imposing, clearing and controlling the Register requirements to be necessarily fulfilled.

1.2 Definition.

1.2.1 Condition/Requirement is a description of specific measures taken to eliminate identified deficiencies/defects which shall be completed within a specific time limit for the possibility to retain the ship's class and/or certificate issued on behalf of the Flag State MA. In the context of the Annex, the conditions/requirements shall be classified as the Condition of Class and Statutory Conditions¹.

1.2.1.1 Conditions of Class are the requirements relating to the items of ship classification .

1.2.1.2 Statutory Conditions are applicable to the items of the RS technical supervision, subject to surveys stipulated for the certificates issued to the ship as authorized by the Flag State MA.

1.2.2 The RS procedure of work on imposing of the requirements/extension of previously imposed requirements (conditions) as regards nonconformities is given schematically in Annex 17-1;

instructions as specified in the Annex, are additional to the provisions of Section 7 of Part I "General Provisions", para 4.2.3 of Part III "Survey of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for the Equipment of Sea-Going Ships" of the Guidelines (depending on the requirement type).

1.2.3 Deficiencies/Defects are identified as detainable and minor.

1.2.3.1 Minor Deficiencies/Defects. Minor Deficiencies/Defects include those which cannot be eliminated in the port of survey but the RS surveyor has revealed that the ship and its equipment comply with the provisions defined in the relevant Certificate and the ship is fit for proceeding to sea as it is not considered to pose a danger to the persons on board or it is unlikely to cause pollution.

1.2.3.2 Detainable Deficiencies/Defects. Detainable Deficiencies/Defects include those which according to the list in 4.2.3.4 of Part III "Survey of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for the Equipment of Sea-Going Ships" of the Guidelines provided that such a list is not comprehensive and it contains examples of detainable Deficiencies/Defects for each International Convention or Code (refer to 4.2.3.2.1 of Part III "Survey of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for the Equipment of Sea-Going Ships" of the Guidelines).

1.2.4 Memoranda is a synopsis of records/actions on the items of the RS technical supervision or ship in general to which the shipowner/RS surveyor shall pay a special attention and/or perform (depending on the nature of information) in service or ship surveys. Memoranda shall be introduced in the proper section of the Ship's Survey Status for compliance with the Class and International Conventions requirements (as regards applicability) and in stipulated cases into the RS records issued on the basis of the survey results. Additional information is not a requirement according to 1.2.1.

¹The definition "Conditions" shall also relate to the terms most frequently used in the ACS rules, in particular, recommendations/conditions of class assignment/retainment.

2 PROCEDURE FOR IMPOSING, CLEARING AND CONTROLLING REQUIREMENTS

2.1 The requirements shall be imposed for the following:

repairs or renewals related to damages that affect Classification (e.g. grounding, structural damages, machinery damages, wastage over the allowable limits, etc);
supplementary survey requirements;
temporary repairs.

2.2 The requirements imposed may necessitate temporary repair and/or require imposing limitations related to navigation and operation that are deemed necessary for continued operation under Classification (e.g. loss of anchor and/or chain, etc.).

2.3 The requirements imposed by the Register shall be brought to the notice of the shipowner/ duly authorized representatives of the shipowner/master of a ship in writing; they shall be clearly stated in the relevant section of the survey status of a ship, in the ship's survey statement/report on survey of the ship and, if necessary, in the Classification certificate in section "Temporary Restrictions and Remarks" in short with reference to the statement/report with the requirement and term of its fulfillment. In cases of imposing of the requirements subject to the necessity of submitting of the documentation on stability, strength, damage stability, verification of the hull structural members according to the RS Rules, software on stability and strength etc. to the RS Head Office for review and approval, the text of requirement has to be arranged, at least, by the following principle: "Documentation agreed/approved by RHO (the word "Documentation" shall be replaced with specific name(s) of documentation) shall be submitted to the RS Surveyor on board before (the term shall be specified).

2.4 For repairs not completed at the time of survey, a requirement shall be imposed with a time limit for completion of the repairs. In order to provide adequate information to the Surveyor attending for survey of the repairs, the requirements shall be sufficiently detailed with identification of items to be repaired. For identification of the extensive repair, reference may be given to the appropriate Survey Report.

2.5 Time period assigned until performance of the thorough repair.

2.5.1 For the hull structures and ship's equipment:

.1 for temporary repair of the structures and ship's equipment, classified by category 1 in compliance with 2.5.3, until the nearest location where prompt and thorough repair shall be done (this may require imposing of service restrictions for the ship's voyage) or until the nearest survey of the ship by the decision of RHO in consent with the Flag State MA, if required under agreement;

.2 for temporary repair of the structures and ship's equipment classified by category 1 in compliance with 2.5.3 (if the damages on one of these hull members are localised or isolating, and without affecting the integrity of the ship), until the nearest annual/intermediate/special survey by the decision of the RS Branch Office performing survey;

.3 for temporary repair of the structures, classified by category 2 in compliance with 2.5.3 until the nearest annual/intermediate or special survey by the decision of the RS Branch Office performing survey.

2.5.2 For the mechanisms, systems, equipment, arrangement, etc.:

.1 the term of fulfillment of thorough repair of mechanisms, systems, equipment, arrangement may be extended in such a case only when at time of temporary repair the safety of the ship in whole and working condition of the object being repaired is provided on the level enough for confirmation of compliance of the ship with the applicable requirements of conventions and the RS rules. Otherwise, the fulfillment of the temporary repair is not allowed.

2.5.3 Hull structures and ship's equipment are classified by the essentiality as follows:

.1 structures and ship's equipment affecting the hull integrity and strength, watertight or weathertight integrity of the ship's hull, namely: bottom structure and bottom plating; side shell plating and side structures (including shell frames with their end attachments); deck plating and deck structures; inner bottom plating and structures; inner side plating; watertight or oiltight bulkheads; hatch covers and hatch coamings; welded connections of air pipes to deck plating; air heads on the open decks; ventilators including dampers;

.2 all the remaining structures and arrangements, not listed in 2.5.3.1.

2.5.4 In any case, when deficiencies are detected it is necessary to be guided by the provisions of 4.2.3, Part III "Survey of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for the Equipment of Sea-Going Ships" of the Guidelines.

2.6 Clearance of requirements shall be supported by a Survey Report giving details of all associated repairs and/or renewals, or of the supplemental surveys carried out. Repairs carried out shall be reported with identification of:

- compartment and location;
- structural member;
- repair method;
- repair extent;
- NDT/tests.

2.7 Partially dealt with requirements shall be supported by a Survey Report giving details of repairs and/or renewals, or of that part of the supplemental surveys carried out and those parts remaining outstanding.

2.8 For each requirement, the date for completion thereof shall be assigned. Shipowners shall be notified of these dates and that the ship's class will be subject to a suspension procedure if the item is not dealt with, or postponed by agreement by the due date. Classification will be reinstated upon verification that the overdue requirement has been satisfactorily dealt with. However, the ship shall be disclassified from the date of class suspension up to the date of class reinstatement.

3 GUIDELINE FOR IMPOSING, CLEARING AND CONTROLLING ANY EXTENSION GRANTED

3.1 Arrangements for the Register to follow for imposing and clearing requirements.

3.1.1 Reasons for imposing requirements shall include:

- damages that affect or may affect classification, such as grounding;
- structural damages, machinery damages, corrosion, deficiencies (e.g. missing required Rule documentation and/or equipment);
- additional survey requirements;
- temporary repairs.

3.1.2 The requirements may require immediate repair prior to ship's departure.

3.1.3 Temporary repairs and/or limitations related to navigation and operation may be required.

3.1.4 The requirements shall be limited to a specific time period or be associated with the next appropriate periodical survey, but shall not exceed the special survey/renewal survey, except in special circumstances.

3.1.5 The requirements shall be supported by a Survey Report including identification of:

- compartment and location;
- structural member;
- details of findings.

For repairs not completed at the time of survey, the requirements shall be imposed with a specific time limit for the repairs. In order to provide correct and proper information to the Surveyor attending for completion of the repairs, the requirements shall be sufficiently detailed with identification of each item to be repaired.

3.1.6 Partially dealt with the requirements shall be supported as per the above item 2.6 by a Survey Report giving details of repairs carried out and those parts remaining outstanding. Repairs carried out shall be reported as per the above item 2.5. For those parts remaining outstanding, any modified requirements shall be given in writing to Owners' representative.

3.2 Arrangements on controlling the Register requirements.

3.2.1 Where repairs other than described in 3.1.5 and/or renewals are required, extension of the requirements will not normally be agreed.

3.2.2 If an extension to the requirements is agreed to in special circumstances, it shall be based upon the following:

the requirements shall be re-examined by another Surveyor to determine if the ship is in condition to sail for the extension period, or,

if re-examination by another Surveyor is not possible, agreement by the Surveyor who originally imposed the requirements shall to be documented, or,

if not supported by a survey report or the Surveyor cannot be contacted, justification for an administrative extension shall be documented, and,

subsequent extensions shall not be granted.

3.3 Verification of fulfilment of the imposed requirements contained in the Register documents.

3.3.1 In order to verify fulfilment of the requirements contained in the Register documents, the Surveyor shall provide the following:

.1 prior to survey, the Branch Office carrying out the survey shall, in accordance with the Regulations on Registration of Ship Surveys, receive from the RS Branch Office for in-service supervision data on the ship survey status, in which all available Register requirements in force are listed;

.2 when reviewing the RS ship's documents prior to beginning of any survey, it is necessary to place particular emphasis upon the presence in the Survey Reports and Certificates of current comments and requirements of the Register, Other Classification Societies, port authorities, Flag State MA, which are not fulfilled (closed out by appropriate notes and stamp of the Surveyor to the Register) and the time for fulfilment of which has already expired. Such review shall be performed beginning from the date of the last special or initial survey carried out (if the ship is within the period of the first special survey). In case where such outstanding requirements are identified, it will be necessary to review thoroughly the subsequent Survey Reports with the aim to identify notes on the fulfilment of the imposed requirements.

If no notes on the fulfilment of the imposed requirements were identified within the prescribed period of time, it is necessary to get the Shipowner to close out these requirements during the survey concerned. The Register documents cannot be issued or confirmed and the ship class shall be suspended if the requirements have not been closed out within the stated period.

In case, where the requirements are fulfilled at the current survey, the Surveyor to the Register shall reflect this in his Survey Report. The entry on the fulfillment of the requirement shall be made in Section "Requirements" of the List of Survey's Status (Form 6.3.51-1);

.3 in well-grounded cases the matter concerning postponement of the date of fulfilment of the requirement imposed previously in the Register documents may be settled by RS (refer to Annex 17-1). In such cases, it is necessary to make an entry on the postponement of the date of fulfilment of the requirement in the same order as specified in 3.3.1.2 for an entry on fulfilment of the requirements;

.4 on the request of the Shipowner the RS Branch Office for in-service supervision may take a decision on applying methods to close out the previously imposed requirements in terms of a ship's equipment with the missing technical documentation without ship attendance by the RS Surveyor. However, the shipowner shall submit a written report on its fulfilment, which shall contain data on time and place of the missing technical documentation dispatch on board, number and date of the design approval letter (where necessary) and a title page copy. If the decision is made on possible closing out a requirement into the Ship Survey Status the RS Branch Office for in-service supervision shall introduce information into the Section "Memoranda for Shipowners and Surveyors" on the necessity of the fulfilled requirement controlling during the next ship attendance by the RS Surveyor. The results of the verification of the imposed requirements shall be entered into the Survey Report (Form 6.3.10 or 6.1.03);

.5 in the RS Branch Office for in-service supervision the personnel authorized to control the terms for fulfilment of the requirements shall monitor daily the due fulfilment of the requirements as required 4.1.3 of Part II "Carrying out Classification Surveys of Ships" of the Guidelines;

.6 if terms for fulfilment of the requirement have expired and the RS Branch Office for in-service supervision has no confirmation of its fulfilment, then in conformity with the provisions of 4.3, Part II of "Carrying out Classification Survey of Ships" of the Guidelines, the Shipowner shall be immediately notified that the ship class will be suspended;

.7 when introducing the requirements into the Register documents, it is necessary to take into account that the requirements shall be imposed only with respect to the defects and faults of the hull, machinery, equipment and outfit, identified during survey and affecting the safety of the ship, human life, prevention of environmental pollution and safety of cargo. Submission of the items of technical supervision (such as inflatable life-saving appliances, hydrostats, fire extinguishers, radio beacons, magnetic compasses, radio direction-finders, nautical charts and guides to navigation, etc.) for compulsory periodical inspections by competent authorities within the stipulated periods and replacement of the items of supervision with expired service life (such as pyrotechnics, food ration, first-aid outfits of the survival craft, foam concentrates, etc.) is the Shipowner's duty. Therefore, requirements regarding timely checks to be performed by the competent authorities or replacement of the above equipment and outfit, except when the terms for the checks or replacement have expired, shall not be set forth in the Survey Reports.

Annex 17-1

RS procedure of work on imposing of requirements/extension of previously imposed requirements (conditions)

Types of conditions	Authorized decision-maker/responsible decision maker		Agreement among the RS/RHO Branch Offices/ Flag State MA
	RS Head Office	RS Branch Office responsible for ship survey	
Detainable deficiencies/defects			
Statutory conditions	+		As per Diagram 1
General (Conditions of Class + Statutory conditions)	+		As per Diagram 1
Conditions of class	+		As per Diagram 1
Minor deficiencies/defects			
Statutory conditions	+(*)	+	As per Diagram 3
General (Conditions of Class + Statutory conditions)	+(*)	+	As per Diagram 3
Conditions of class		+	As per Diagram 4
<p>(*) If agreement with Flag State MA is required</p> <p>Diagrams of Agreement among the RS/ RHO Branch Offices/ Flag State:</p> <p>1. The RS Branch Office performing survey of the ship forwards copies of the shipowner's request with substantiated reasons for failure to fulfil the requirements, Report on Ship's Survey, opinions of the RS surveyor to the RS Branch Office for in-service supervision; the RS Branch Office for in-service supervision sends its opinion substantiation to the RHO; RHO shall agree the issue with the Flag State MA, if necessary, according to the arrangement conditions to issue the conditional certificates (short term certificates);</p> <p>RHO shall make a decision and send a copy of the shipowner's request with substantiated reasons for failure to fulfil the requirements, Report on Ship's Survey, opinions of the RS surveyor to the RS Branch Office for in-service supervision .</p> <p>2. The RS Branch Office performing survey of the ship forwards copies of the shipowner's request with substantiated reasons for failure to fulfil the requirements, Report on Ship's Survey, opinions of the RS surveyor to the RS Branch Office for in-service supervision; the RS Branch Office for in-service supervision sends its opinion substantiation to the RHO;</p> <p>RHO shall make a decision and send an instruction to the Rs branch Office conducting a survey and copies to the RS Branch Office for in-service supervision.</p> <p>3. RHO shall agree the issue with the Flag State MA, if necessary, according to the arrangement conditions to issue the conditional certificates (short term certificates) based on the request of the RS Branch Office performing the ships survey with a substantiated reason for failure to fulfil the requirement, Report on Ship's Survey, opinions of the RS Surveyor to the RS Branch Office for in-service supervision.;</p> <p>RHO shall make a decision and submit instructions to the RS Branch Office performing the ship's survey and in the copy to the RS Branch Office for in-service supervision.</p> <p>4. The RS Branch Office performing the ship survey shall make a decision based on the request of the RS Branch Office performing the ships survey with a substantiated reason for failure to fulfil the requirement, Report on Ship's Survey, opinions of the RS Surveyor.</p>			

18. RECOMMENDATION ON CONDITIONS FOR THE APPROVAL OF SERVICING STATIONS FOR INFLATABLE LIFERAFTS

1. The Flag State Administrations shall ensure that the periodic survey of the inflatable liferafts is performed at the servicing stations that have demonstrated competence to service and repack rafts, maintain an adequate facility and use only properly trained personnel. In order to be approved, the servicing stations shall demonstrate this capability for inflatable liferafts of each Manufacturer whose liferafts they are competent to service and shall comply with the following requirements:

.1 servicing of inflatable liferafts shall be carried out in fully enclosed spaces only. There shall be enough room for the number of inflatable liferafts expected to be serviced at any time simultaneously. The ceiling shall be sufficiently high to allow the largest liferafts to be serviced turned over when inflated, or an equally efficient means to facilitate inspection of the bottom seams are to be provided;

.2 the floor shall be provided with a clean surface sufficiently smooth to ensure that no damage will occur to the liferaft fabric;

.3 the servicing space shall be well lit, provided that direct rays of sunlight do not enter the space;

.4 the temperature and, if necessary, the relative humidity in the servicing space shall be sufficiently controlled to ensure that servicing and repairs can be effectively carried out;

.5 the servicing space shall be efficiently ventilated, but be free from draughts;

.6 separate areas or rooms shall be provided for:

.6.1 liferafts awaiting servicing, repair or delivery;

.6.2 the repair of glass fibre containers and the painting of the compressed gas cylinders;

.6.3 materials or spare parts;

.6.4 administrative purposes;

.7 means shall be provided in the liferaft storage space to ensure that liferafts in containers or valises are neither stored on top of each other in more than two tiers unless supported by shelving nor subjected to excessive loads;

.8 spare and obsolete pyrotechnics shall be stored in a separate, safe and secure magazine well away from the servicing and storage spaces;

.9 sufficient tools shall be available for the servicing of liferafts and release gear in accordance with the Manufacturer's requirements, including:

.9.1 suitable and accurate pressure gauges, thermometers and barometers which can be easily read;

.9.2 one or more air pumps for inflating and deflating rafts together with a means of cleaning and drying the air and including necessary high pressure hoses and adapters;

.9.3 a scale for weighing inflation gas cylinders with sufficient accuracy;

.9.4 sufficient gas for blowing through the inlet system of the liferafts;

.10 procedures shall be established to ensure that each gas cylinder is properly filled and gastight before lifting to a liferaft;

.11 sufficient materials and accessories shall be available for repairing liferafts, together with replacements of the emergency equipment to the satisfaction of the Manufacturer;

.12 when servicing davit-launched liferafts, adequate means shall be provided for overload testing of such liferafts;

.13 servicing and repair work shall only be carried out by qualified personnel who have been adequately trained and certificated by the Manufacturer of the liferafts. The training procedure shall ensure that the servicing personnel are made aware of changes and new techniques;

.14 the Manufacturer shall provide the servicing stations with the following:

.14.1 changes to servicing manuals, servicing bulletins and instructions;

.14.2 proper materials and spare parts;

.14.3 bulletins or instructions from the Flag State Administration;

.14.4 training for servicing technicians;

.15 smoking shall not be allowed in servicing and packing areas.

2. After initial approval, the Flag State Administrations shall arrange for frequent inspection of servicing stations to ensure that the Manufacturer support is up to date and effective and that the requirements of the present Recommendation are complied with.

3. The Flag State Administration shall ensure that information regarding servicing facilities for inflatable liferafts is made available to mariners.

SERVICING OF THE INFLATABLE LIFERAFTS

1. The following tests and procedures shall be carried out, except provided otherwise, at every servicing of an inflatable liferaft fitted as life-saving equipment.

2. Inflatable liferaft servicing shall be carried out in accordance with the appropriate Manufacturer's servicing manual. Necessary procedures shall include, but not to be limited to, the following:

.1 inspection of the container for damage;

.2 inspection of the folded liferaft and interior of the container for signs of dampness;

.3 a gas inflation (GI) test shall be carried out at 5-years intervals, and when undertaking a gas inflation test, special attention shall be paid to the effectiveness of the relief valves. The folded raft shall be removed from its container before activating the fitted gas inflation system. After gas inflation has been initiated, sufficient time shall be allowed to enable the pressure in the buoyancy tubes to become stabilized and the solid particles of CO₂ to evaporate. After this period, the buoyancy tubes shall, if necessary, be topped up with air, and the liferaft subjected to a pressure holding test over a period of not less than 1 hour during which the pressure drop will not exceed 5 per cent of the working pressure;

.4 each liferaft shall be subjected to the necessary additional pressure (NAP) test as described in Appendix 1, at yearly intervals after the tenth year of the liferaft service life unless earlier servicing is deemed necessary as a result of visual inspection. After allowing sufficient time for the liferaft to regain fabric tension at working pressure, the liferaft shall be subjected to a pressure holding test over a period of not less than 1 hour during which the pressure drop will not exceed 5 per cent of the working pressure;

.5 when a NAP or GI test is not required, a working pressure (WP) test (see Appendix 2) shall be carried out by inflation of the liferaft with the dry compressed air, after removing it from the container shell or valise and from its retaining straps (if fitted), to at least the working pressure, or to the pressure required by the Manufacturer's servicing manual if higher. The liferaft shall be subjected to a pressure holding test over a period of not less than 1 hour during which the pressure drop will not exceed 5 per cent of the working pressure;

.6 while inflated, the liferaft shall be subjected to a thorough internal and external examination in conformity with the Manufacturer's manual;

.7 the floor shall be inflated, checked for broken reeds and tested in accordance with the Manufacturer's manual;

.8 the seams between floor and buoyancy tube shall be checked for slippage or edge lifting;

.9 with the buoyancy tube supported at a suitable height above the service floor so that the floor seams become unsupported, as indicated in Fig. 2.9, a person weighing not less than 75 kg shall walk/crawl around the perimeter of the floor for the entire circumference and the floor seams are to be checked again. The Manufacturers may substitute any other seam test which will determine the strength of the floor seam until the next inspection is due. This test shall be carried out at yearly intervals after the tenth year of the liferaft service life;

.10 after deflation, arch roots are to be checked in conformity with the Manufacturer's manual;

.11 all items of outfit shall be checked to ensure that they are in good condition and that dated items are replaced at the time of servicing in cases where the expiry date is before the next date of servicing of the liferaft;

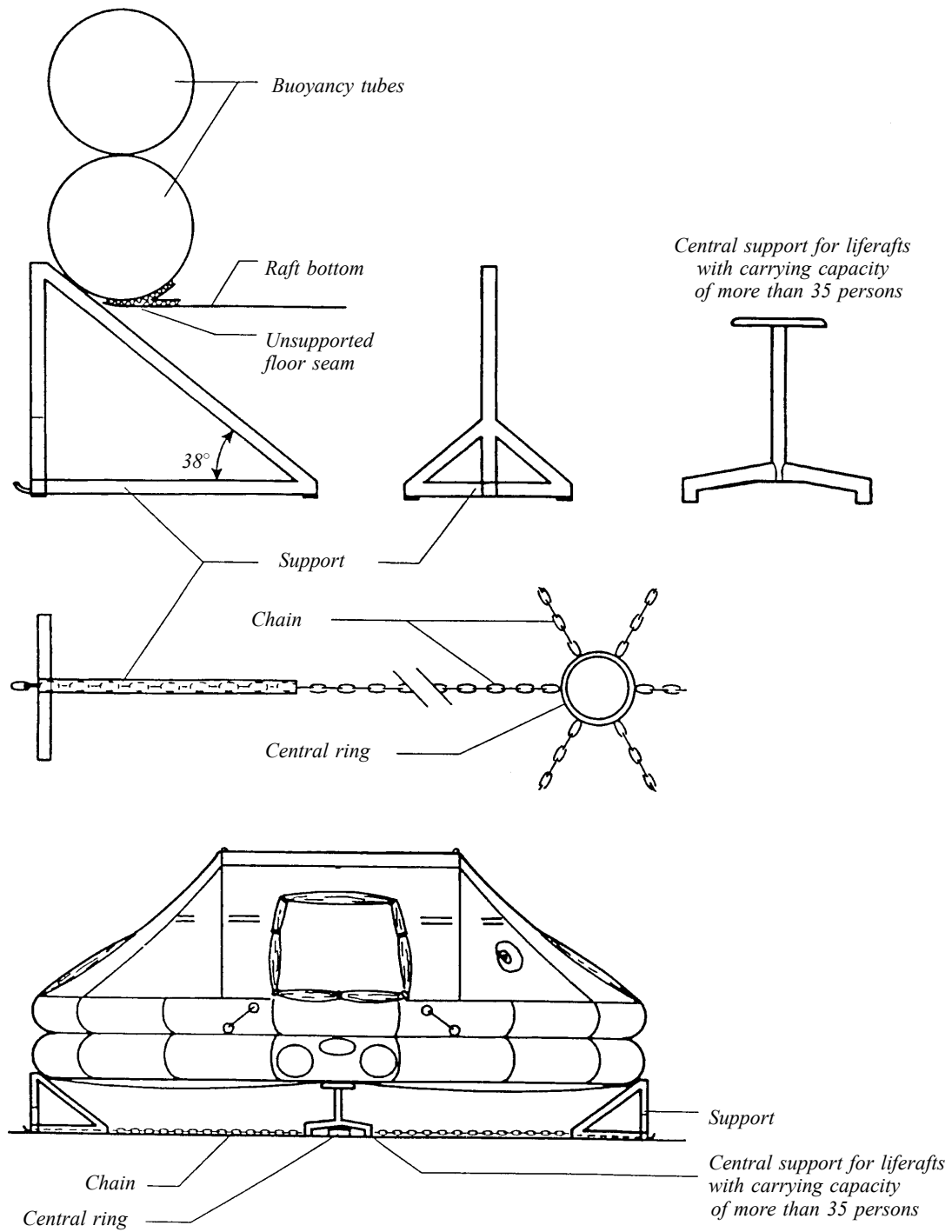


Fig. 2.9
Installation of supports for testing the floor seams

.12 davit-launched liferafts shall be subjected to a 10 per cent overload suspension test at every second servicing. There is no need to carry out the required floor seam test after a lapse of eleven years and in succeeding years when servicing the davit-launched liferafts if the suspension test has been carried out;

.13 a check shall be made to ensure that the liferaft and the atmosphere are dry when the liferaft is being repacked;

.14 the required marking shall be updated and checked;

.15 a report of servicing shall be kept for at least 5 years after the date of servicing;

.16 statistical records shall be prepared on all liferafts serviced, indicating, in particular, defects found, repairs carried out and recognized as not complying with the requirements and withdrawn from service. Such statistics shall be available to the Administration.

RESPONSIBILITIES OF MANUFACTURERS, SHIPOWNERS AND FLAG STATE ADMINISTRATIONS

1. In order to ensure that the servicing of inflatable liferafts is effectively conducted to provide reliable waterborne survival craft in an emergency, Manufacturers, Flag State Administrations and Shipowners shall meet the conditions listed in 1.1 to 1.3.

1.1 The Manufacturers are responsible for:

.1 ensuring that their liferafts can be adequately serviced in conformity with the present Recommendation or with other additional requirements necessary for that particular product and design and thereto accredit a sufficient number of the servicing stations;

.2 ensuring that each service station accredited by them for servicing and repair of their liferafts has qualified personnel whom they have adequately trained and certificated to perform such work and who are aware of any changes or new techniques;

.3 keeping Flag State Administrations fully informed as to the list of servicing stations accredited by them and any changes thereto;

.4 making available to service stations:

changes to servicing manuals, servicing bulletins and instructions;

proper materials and spare parts;

bulletins and instructions from the Flag State Administration;

.5 keeping Flag State Administrations fully informed of any shipping casualties known to them and involving their liferafts; and also of any failures of liferafts, other than failures during inspections which are known to them;

.6 informing Shipowners whenever possible of any deficiency or danger known to them and related to the use of their liferafts and taking whatever remedial measures they deem necessary.

1.2 Flag State Administrations are responsible for approval of the servicing stations for inflated liferafts and for conducting periodical inspections of servicing stations to determine compliance with the present Recommendation and for checking quality assurance by such checks or inspections that are deemed to be adequate to achieve compliance. However, in order to approve the servicing stations for the liferafts located in other countries, the Flag State Administration may accept or recognize the servicing stations approved, checked or inspected by the Surveyors appointed for this purpose or by the recognized organizations or by the other Contracting Governments in accordance with the requirements of the 1974 SOLAS Convention.

1.3 The Shipowners are responsible for ensuring, as a minimum requirement, that all liferafts fitted as life-saving equipment are approved and are serviced at the appropriate intervals at an approved servicing station. Whenever practicable, a representative of the Shipowner shall be in attendance during service.

Appendix 1

NECESSARY ADDITIONAL PRESSURE TEST

1. When the necessary additional test is carried out, it is necessary to:

.1 plug the pressure release valves;

.2 gradually raise the pressure to the lesser of 2,0 times the working pressure or that sufficient to impose a tensile load on the inflatable tube fabric of at least 20 per cent of the minimum required tensile strength;

.3 after 5 min, there shall be no seam slippage, cracking or other defect (see Resolution MSC.689(17), part 1, par. 5.17.7), or significant pressure drop. If cracking in the buoyancy tubes is audible, the liferaft shall be recognized as not complying with the applicable requirements; if no cracking is heard, the pressure in all buoyancy chambers shall be reduced simultaneously by removing the plugs from the pressure release valves;

2. Liferaft manufacturers shall include tables in their servicing manuals of exact NAP test pressures corresponding to their particular tube sizes and fabric tensile strength requirements, calculated according to the equation:

$$p(\text{kg/cm}^2) = \frac{2 \times \text{tensile strength (kg per 5 cm)}}{25 \times \text{diameter (cm)}} .$$

Appendix 2

FREQUENCY OF NAP TESTS: WORKING PRESSURE, GAS INFLATION AND FLOOR SEAM STRENGTH

Servicing intervals	Annual floor seam and pressure test methods
End of first year	WP test
End of second year	WP test
End of third year	WP test
End of fourth year	WP test
End of fifth year	GI test
End of sixth year	WP test
End of seventh year	WP test
End of eighth year	WP test
End of ninth year	WP test
End of tenth year	GI + FS test
Eleventh to fourteenth year	NAP + FS test
Fifteenth year	GI + NAP + FS test
Sixteenth to nineteenth year	NAP + FS test
Twentieth year	GI + NAP + FS test
Twenty-first to twenty-fourth year	NAP + FS test
Twenty-fifth year, etc	GI + NAP + FS test
<p style="text-align: center;">S y m b o l s :</p> <p>NAP – Necessary additional pressure test (see Appendix 1)</p> <p>WP – Working pressure (compressed air)</p> <p>GI – Gas inflation (fitted gas)</p> <p>FS – Floor strength</p>	

19. MODEL REPORT FOR LIFEBOUYS AND LIFEJACKETS

REPORT _____

of «____» _____ 20____

The specialized station for the survey, test and repair of lifebuoys and lifejackets has carried out a special survey of the lifebuoys and lifejackets belonging to

(name of the owner of the life-saving appliances)

The survey has shown that the lifebuoys _____ pcs.
and lifejackets _____ pcs. are in good technical condition.

The lifebuoys are equipped with:
self-igniting lights _____ pcs.
light and smoke markers _____ pcs.
lifeline _____ pcs.

The lifejackets are fully equipped with batteries, electric light bulbs, whistles.

Date of the next special survey _____
(date)

Checked by _____
(signature) (full name)

Equipped by _____
(signature) (full name)

Received by _____
(signature) (full name)

L.S.

Head of the specialized station _____
(signature) (full name)

20. FORM L

IACS

INTERNATIONAL ASSOCIATION
OF CLASSIFICATION SOCIETIES

FORM L

(Tick all check boxes as appropriate)

- ☐ LOSING SOCIETY'S TRANSFER OF CLASS
☐ ADDING CLASS OF A SECOND SOCIETY TO A VESSEL CLASSED BY THIS (FIRST) SOCIETY
☐ ADVICE TO THE REMAINING SOCIETY WHEN WITHDRAWING FROM DOUBLE OR DUAL CLASS

To:	Gaining or second or remaining Society:	Fax No./e-mail address:
	TOC database	on-line database
From:	Losing or first or withdrawing Society:	Fax. No./e-mail address:

Vessel Data			
Name of Vessel		ID No.	
Gross Tonnage		IMO No.	
Flag		Year of build	
Vessel Type	<input type="checkbox"/> OT Oil Tanker <input type="checkbox"/> CT Chemical Tanker <input type="checkbox"/> GT Gas Tanker <input type="checkbox"/> LC Other Bulk Liquid Carrier <input type="checkbox"/> BC Bulk Carrier (all combinations OB, OBO, OO) <input type="checkbox"/> GC General Cargo Vessel (including Ro-Ro Cargo, Container, Reefer, HSC Cargo) <input type="checkbox"/> PS Passenger Vessel (including Passenger / General Cargo, Passenger / Ro-Ro, Passenger HSC) <input type="checkbox"/> ZZ Other Vessel Type		
Build Yard & No.			
Owner			
Society during Construction		Date of entry into the losing or first or withdrawing Society	DD MM YY
Record of Previous Transfer of Class, if available			
Society	Date Classed	Society	Date Classed
	DD MM YY		DD MM YY
Society	Date Classed	Society	Date Classed
	DD MM YY		DD MM YY
Status of compliance with URs S19/22/23/26/27/30/31, if applicable			
Information already included in the survey status			<input type="checkbox"/>
	Not applicable	Due date for compliance	Date initial compliance verified
URs S19/S22/S23	<input type="checkbox"/>	DD MM YY	DD MM YY
URs S26	<input type="checkbox"/>	DD MM YY	DD MM YY
URs S27	<input type="checkbox"/>	DD MM YY	DD MM YY
URs S30	<input type="checkbox"/>	DD MM YY	DD MM YY
URs S31	<input type="checkbox"/>	DD MM YY	DD MM YY

IACS**INTERNATIONAL ASSOCIATION
OF CLASSIFICATION SOCIETIES****FORM L****Part A – Survey Status Information (See Note 1)**

Date Survey Status Request, or request for first Certificate of Class in case of transfer of class or adding class at ship's delivery, received DD MM YYYY

- ☐ A full list of overdue surveys / outstanding recommendations / conditions of class with the respective due dates for the vessel identified above is attached.
- ☐ In case of transfer of class or adding class at vessel's delivery, details of the first Certificate of Class, including the list of any recommendations / conditions of class and the list of any information normally contained in the classification status for the vessel identified above is attached.
- ☐ There is no overdue survey nor outstanding recommendation / condition of class.
- ☐ There is/are survey report(s) outstanding. (if this box is ticked, then Part A-1 is applicable)
- ☐ There is no survey report outstanding.
- ☐ Structural diminution allowances are attached.
- ☐ Structural diminution allowances: see document circulated by letter Ref.Date
- ☐ Structural diminution allowances will be sent within five (5) working days. (if this box is ticked, then Part A-1 is applicable)

- ☐ Class is **not** suspended, nor withdrawn

- ☐ Class is suspended, with effect from (date) DD MM YYYY
Reason for suspension:

- ☐ a = Survey Overdue
- ☐ b = Non-compliance with Recommendations / Conditions or Class
- ☐ c = Other Safety Related
- ☐ d = Pending Disposition of Casualty
- ☐ e = Other Non-Safety Related

- ☐ Class was withdrawn, with effect from (date) DD MM YYYY
Reason for withdrawal:

- ☐ 0 = Transfer of class amongst Societies holding a QSCS certificate
- ☐ 1a= At the Owner's request due to the reasons other than identified in 1b, 1c or 2
- ☐ 1b= Scrapped/Sold for Scrap
- ☐ 1c= Casualty
- ☐ 2 = Transferred to a Society not holding a QSCS certificate
- ☐ 3a= Overdue Surveys
- ☐ 3b= Non-compliance with Recommendations / Condition of Class
- ☐ 3c= Safety Related other than identified in 3a or 3b
- ☐ 4 = Other Non-Safety Related or Unidentified

Signature: Date: DD MM YYYY

IACSINTERNATIONAL ASSOCIATION
OF CLASSIFICATION SOCIETIES**FORM L**

Part A-1 – Additional Survey Status Information (See Note 2)	
<input type="checkbox"/> A list of additional overdue surveys and additional outstanding recommendations / conditions of class which were not included in Part A is attached. <input type="checkbox"/> Structural diminution allowances are attached. <input type="checkbox"/> No further information.	
Signature:	Date: DD MM YYYY

IACSINTERNATIONAL ASSOCIATION
OF CLASSIFICATION SOCIETIES**FORM L**

Part B – Report on Withdrawal of Class on Transfer to, or maintenance of class with another Society (See Note 3)	
Date Class Withdrawn	DD MM YYYY
Signature:	Date: DD MM YYYY

USE OF FORM L

1. The Form shall be completed by the RS Head Office.
2. Form L shall be created and updated on the on-line TOC database maintained by the IACS Permanent Secretariat. The Form shall then be faxed or e-mailed to the other Society in accordance with the Notes below.
3. Form L shall be used:
 - .1 by the losing Society for reporting withdrawal of class due to a transfer of class to another society (refer to 5.1.5 and 5.1.7);
 - .2 by the first Society in connection with adding the class of a second society to a ship already classed by the first Society (refer to 6.3 and 6.4);
 - .3 by the withdrawing Society for advising the remaining Society when withdrawing from double or dual class (refer to 6.5.2 and 6.7);
4. using the following Notes:
 - .1 This form, with Part A duly completed, shall be sent by fax or e-mail to the gaining/second remaining Society within two (2) working days of receipt of the gaining/second remaining Society's Survey Status Request. A full list of overdue surveys and recommendations/conditions of class retainment with the respective due dates for the vessel is to be attached to the copy sent to the gaining/second/remaining Society. Surveys and recommendations/conditions of class which have not been completed by their due date (including window period), when a ship is laid-up in accordance with the Society's rules prior to such due date (including window period), are not to be declared as overdue within the scope of the information to be included in Form L.

In the case of transfer of class/adding class at vessel's delivery, the two (2) working days do not apply.

.2 if the fourth and/ or the eighth box of Part A are ticked, this form, with Part A-1 duly completed, is to be sent to the gaining/ second/ remaining Society within one (1) month from issuance of the losing/first/ withdrawing Society's Survey Status for advising additional survey status information which has not been provided in the previous reporting to the gaining/second/remaining Society;

.3 This form, with Parts A, A-1 (when applicable) and B duly completed, is to be sent to the gaining/ remaining Society when class has been withdrawn from a vessel which has transferred to another Society or withdrawn from double class.

21. FORM G

IACS

INTERNATIONAL ASSOCIATION
OF CLASSIFICATION SOCIETIES

FORM G

(Tick all check boxes as appropriate)

- ☐ GAINING SOCIETY'S TRANSFER OF CLASS
☐ REASSIGNMENT OF CLASS
☐ ADDING CLASS OF A SECOND SOCIETY TO A VESSEL CLASSED BY ANOTHER (FIRST) SOCIETY
☐ MAINTENANCE OF CLASS WITH THIS (REMAINING) SOCIETY WHEN WITHDRAWING FROM DOUBLE CLASS

To:	Losing or first or withdrawing Society:	Fax No./e-mail address:
	TOC database	on-line database
From:	Gaining or second or remaining Society	Fax No./e-mail address :

Gaining or second or remaining Society's Vessel Data		
Name of Vessel	ID No.	
Vessel Type	<input type="checkbox"/> OT Oil Tanker <input type="checkbox"/> CT Chemical Tanker <input type="checkbox"/> GT Gas Tanker <input type="checkbox"/> LC Other Bulk Liquid Carrier <input type="checkbox"/> BC Bulk Carrier (all combinations OB, OBO, OO) <input type="checkbox"/> GC General Cargo Vessel (including Ro-Ro Cargo, Container, Reefer, HSC Cargo) <input type="checkbox"/> PS Passenger Vessel (including Passenger / General Cargo, Passenger / Ro-Ro, Passenger HSC) <input type="checkbox"/> ZZ Other Vessel Type	Flag
Owner		

Effective from 1 July 2009

V.16 July 2009

IACS

INTERNATIONAL ASSOCIATION
OF CLASSIFICATION SOCIETIES

FORM G

Part A - Survey Status Request (See Note 1)	
Name of Vessel (Prior to Transfer of Class or Adding Class or Withdrawing Class)	ID No. (Losing or first or withdrawing Society's, If known)
Gross Tonnage	IMO No.
<p>In accordance with PR1A or PR1B, please provide details of the current survey status, including a full list of overdue surveys and recommendations / conditions of class with respective due dates for the vessel identified above.</p> <p>In case of transfer of class or adding class at vessel's delivery, please provide details of the first Certificate of Class, including the list of any recommendations / conditions of class and the list of any information normally contained in the classification status.</p> <p>Attached hereto is a copy of the Owner's authorization for release of the information requested to the gaining or second or remaining Society named on this form.</p> <p> <input type="checkbox"/> We request the facility for record review in accordance with PR1A, A.2.2.2 or PR1B, D.2.2.2. <input type="checkbox"/> We request a copy of the records in accordance with PR1A, A.2.2.3 or PR1B, D.2.2.3. </p>	
Date request for class was received	Date DD MM YYYY
Signature	Date DD MM YYYY

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INTERNATIONAL ASSOCIATION
OF CLASSIFICATION SOCIETIES

FORM G

Part B - Report on Issue of Interim Certificate of Class or maintenance of Class (See Note 2)			
Date Survey Status, or first Certificate of Class in case of transfer of class or adding class at ship's delivery, received		DD	MM YYYY
Change of Owner	<input type="checkbox"/> Yes <input type="checkbox"/> No	Change of Flag	<input type="checkbox"/> Yes <input type="checkbox"/> No
Reason for Class Entry	<input type="checkbox"/> Transfer from another Society <input type="checkbox"/> Reassignment of class to a vessel class withdrawn previously due to a reason other than transfer of class amongst Societies <input type="checkbox"/> Adding class as double class <input type="checkbox"/> Adding class as dual class		
Maintenance of Class	<input type="checkbox"/> (when withdrawing from double class)		
<input type="checkbox"/> Survey status not received within three working days of request <input type="checkbox"/> For transfer of class or adding class at vessel's delivery, first Certificate of Class not received from losing / first Society on the day of vessel's delivery. <input type="checkbox"/> A list of dates, locations and actions taken to satisfy each overdue survey and overdue recommendation / condition of class as specified to the Owner by the losing or withdrawing Society is attached <input type="checkbox"/> No relevant items provided by the losing or withdrawing Society			
Date of Issue of Interim Certificate of Class		Date	DD MM YYYY
Signature		Date	DD MM YYYY

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INTERNATIONAL ASSOCIATION
OF CLASSIFICATION SOCIETIES

FORM G

Part B-1 - Report on Additional Information received by the losing or first or withdrawing Society (See Note 3) (to be completed only if Part A-1 of Form L is received)	
<input type="checkbox"/>	A list of dates, locations and actions taken to satisfy each additional overdue survey and additional overdue outstanding recommendation / condition of class as specified to the Owner by the losing or first or withdrawing Society is attached
<input type="checkbox"/>	No relevant items provided by the losing or first or withdrawing Society
Signature	Date DD MM YYYY

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INTERNATIONAL ASSOCIATION
OF CLASSIFICATION SOCIETIES

FORM G

Part C - Report on Final Entry into Class or Completion of Transfer to Single Class (See Note 4)	
Date of Final Entry into Class or Completion of Transfer to Single Class from Double Class	
DD MM YYYY	
<input type="checkbox"/>	A list of dates, locations and actions which have been or will be taken to satisfy each recommendation / condition of class within the due dates as specified to the Owner by the losing or first Society is attached
<input type="checkbox"/>	No relevant items provided by the losing or first Society
Signature	Date DD MM YYYY

USE OF FORM G

1. The Form is to be completed by the RS Head Office.

2. Form G is to be created and updated on the on-line TOC database maintained by the IACS Permanent Secretariat. The Form is then to be faxed or e-mailed to the other Society in accordance with the Notes below.

3. Form G is to be used:

.1 by the gaining Society for reporting transfer of class from another Society (refer to 5.1.2 and 5.1.6) using the following Notes:

this form with Part A, duly completed, is to be sent to the losing Society within two (2) working days of receipt of a written request for transfer of class by the gaining Society at its Headquarters or one of its designated control or management centres. In case of transfer of class at vessel's delivery, the two (2) working days do not apply;

this form with Parts A and B, duly completed, is to be sent to the losing Society within one (1) month of the date of issuing an Interim Certificate of Class to a vessel which is transferring from another Society;

when not required to have been dealt with by the losing Society, a list of dates, locations and actions taken to satisfy each overdue survey and overdue recommendation/ overdue condition of class as specified to the Owner by the losing Society is to be attached to the copy sent to the losing Society;

this form with Parts A, B and B-1 duly completed, is to be sent to the losing Society within one (1) month from the completion of the survey to confirm that additional overdue surveys and overdue recommendations/conditions of class have been dealt with;

a list of dates, locations and actions taken to satisfy each additional overdue survey and additional overdue recommendation/ condition of class as specified to the Owner by the losing or first or withdrawing Society is to be attached;

the gaining Society is, within one (1) month of the date of final entry into class, to dispatch this form, with Parts A, B, B-1 (when applicable) and C duly completed to the losing Society;

in cases where the losing Society has reported recommendations/conditions of class on the vessel a list of actions taken with dates and locations and actions to be taken to satisfy each recommendation/ condition of class within the due dates as specified to the owner by the losing Society is to be attached to the copy sent to the losing Society;

.2 by the second Society for reporting addition of class to a vessel already classed by another Society (refer to 6.2.1 and 6.4) using the following Notes:

this form with Part A, duly completed, is to be sent to the first Society within two (2) working days of receipt of a written request for addition of class by the second Society at its Headquarters or one of its designated control or management centres. In the case of adding class at vessel's delivery, the two (2) working days do not apply;

this form with Parts A and B, duly completed, is to be sent to the first Society within one (1) month of the date of issuing an interim Certificate of Class;

this form with Parts A, B and B-1 duly completed, is to be sent to the first Society within one (1) month from the completion of the survey to confirm that additional information regarding outstanding surveys or recommendations/ conditions of class have been taken into account;

the second Society is, on completion of final entry into class, to dispatch this form, with Parts A, B, B-1 (when applicable) and C duly completed, to the first Society;

.3 by the remaining Society for reporting maintenance of class when one class has been withdrawn from double class (refer to 6.5.1) using the following Notes:

this form with Part A duly completed, is to be sent to the withdrawing Society within two (2) working days of receipt of a written request for withdrawal of class by the remaining Society at its Headquarters or one of its designated control or management centres;

this form with Parts A and B, duly completed, is to be sent to the withdrawing Society within one (1) month from the completion of the survey to confirm that overdue recommendations/ conditions of class have been dealt with. Where no overdue items are provided by the withdrawing Society, this form with

Parts A and B, duly completed, is to be sent to the withdrawing Society within one (1) month from the date of sending Form L Part A;

when not required to have been dealt with by the withdrawing Society, a list of dates, locations and actions taken to satisfy each overdue recommendation/ overdue condition of class as specified to the Owner by the withdrawing Society is to be attached to the copy sent to the withdrawing Society;

this form with Parts A, B and B-1, duly completed, is to be sent to the withdrawing Society within one (1) month from the completion of the survey to confirm that additional overdue surveys and overdue recommendations/ conditions of class have been dealt with;

in cases where the withdrawing Society has reported recommendations/ conditions of class on the vessel, a list of actions taken with dates and locations and actions to be taken to satisfy each recommendation/ condition of class within the due dates as specified to the owner by the withdrawing Society is to be attached to the copy sent to the withdrawing Society;

on completion of a transfer of vessel into single class, this form, with Parts A, B, B-1 (when applicable) and C, duly completed is to be sent to the withdrawing Society to report the date of completion of transfer to single class from double class if not yet reported in case 5.3.2.9.1 above;

.4 by Societies for reporting reassignment of class to a vessel which had its class previously withdrawn (refer to 5.1.6) using the following Note:

this form, with Parts B and C duly filled in the fields relevant to a reassignment of class, is to be completed on the on-line TOC database maintained by the IACS Permanent Secretariat within one (1) month of final entry into class when class is reassigned to a vessel class withdrawn previously due to a reason other than transfer of class amongst Societies.

**22. LISTS OF RADIOTECHNICAL SERVICE DOCUMENTS TO BE CARRIED
BY SEA-GOING SHIPS AND SHIPS OF RIVER-SEA NAVIGATION
WITHIN THE JURISDICTION OF THE RF MINISTRY OF TRANSPORT (I)
AND FISHING VESSELS WITHIN THE JURISDICTION OF THE RF STATE FISHERY
COMMITTEE (II)**

**I. LIST OF RADIO COMMUNICATION AND NAVIGATIONAL DOCUMENTS TO BE CARRIED BY SEA-GOING SHIPS AND
SHIPS OF RIVER-SEA NAVIGATION FITTED WITH GMDSS RADIO COMMUNICATION AND RADIO NAVIGATION
EQUIPMENT**

1. Ship radio station license.
2. GMDSS radio personnel certificates.
3. Log books:
 - .1 ship's log book for ships operating in sea areas A1, A2;
 - .2 GMDSS radio log book for ships operating in sea areas A3, A4;
4. Safety Radio Certificate (for ships engaged on international voyages).
5. Report on Survey of Radio Facilities by Russian Maritime Register of Shipping.
6. Report on Survey of Electrical Equipment by Russian Maritime Register of Shipping.
7. Radio Equipment Certificate by Russian Register of Inland Waterways (for ships of river sea navigation classed with the Russian Register of Inland Waterways).
8. Annual Survey Report by the Russian Register of Inland Waterways (for ships of river sea navigation classed with the Russian Register of Inland Waterways).
9. National radio regulations for use by the Maritime Mobile and Maritime Mobile-Satellite Services.
10. Design documentation for the installation of radio communication and navigational equipment as may be amended to take into account all the modifications introduced during operation.
11. Specifications and operation manuals for each type of radio communication and navigational equipment (in Russian for domestic equipment; in Russian and English for equipment manufactured in other countries).
12. Domestic radio communication and navigational equipment files.
13. Instruction for radiotelephone operators on radio watch keeping to ensure safety at sea (regulating document ПД 31.64.24-94).
14. List of VHF radiotelephone coast stations of the Sea Fleet Service (1996).
15. Regulations for using COSPAS-SARSAT satellite emergency position-indicating radio beacons on sea-going ships (regulating document ПД 31.62.03.04-93).
16. Instructions on radio communication with ships of river sea navigation operating in European waters. Approved by Deputy Minister of Transport of the Russian Federation on 18 March 1997 (for ships of river sea navigation).
17. Radio manual for use by the Maritime Mobile and Maritime Mobile-Satellite Services.
18. International reference books (ITU publication):
 - List of Coast Stations and Special Service Stations (List IV);
 - List of Ship Stations and Maritime Mobile-Satellite services (List V);
 - Manual for use by the Maritime Mobile and Maritime Mobile-Satellite services.
19. Guidelines for communication during Arctic navigation (for ships involved in Arctic navigation).
20. Instruction on communication when processing emergency messages and control messages from ships. Approved by Order No.31 of 27 April 1994 of the Department of Maritime Transport.

21. Procedure and regulations for the use of departmental means of communication in maritime transport and list of symbolic notations of maritime transport officers for departmental communication. Approved by Order No.41 of 7 June 1994 of the Department of Maritime Transport.

22. Operating schedule of channels of Russian maritime fleet coast radio stations for communication with ships, transmission of circular, hydrometeorological messages and warnings (1997).

23. Document forms for initial registration under the Annex to Ministry of Maritime Fleet Order No.188 of 30 November 1987:

CB-12 – radio telegram;

CB-13 – accumulator log book;

CB-29 – radio telegram receipt document (for passenger ships);

CB-34 – ship radio station acceptance report.

Notes: 1. In the case of ships operating exclusively in sea area A1, the documents specified in paras 17 to 23 may be omitted.

2. In the case of ships engaged in coastal voyages in sea areas A2 to A4, the international reference books specified in para 18 may be omitted.

II. LIST OF RADIOTECHNICAL SERVICE DOCUMENTS TO BE CARRIED BY FISHING VESSELS WITHIN THE JURISDICTION OF THE RUSSIAN STATE FISHERY COMMITTEE

Nos	Document name	Ship category ¹			Notes
		1	2	3	
1	National radio regulations for use by the Maritime Mobile and Maritime Mobile-Satellite Services	+	+		Approved by Order No.296 of 19.10.99 of Russian State Fishery Committee
2	Regulations for radiocommunication arrangements on fishing vessels taking into account GMDSS	+	+	+	
3	Manual for use by the Maritime Mobile and Maritime Mobile-Satellite Services	+			
4	Operating schedule of call and working communication channels of the serving radio centre	+	+	+	For ships engaged on international voyages
5	International list of coast stations				
6	International list of radiodetermination and special service stations				For ships engaged on international voyages
7	International list of call signs and numerical identities (list VIIA)				For ships engaged on international voyages. Introduced by Order No.324 of 12.08.02 of Russian State Fishery Committee
8	International list of ship stations				For ships engaged on international voyages. Introduced by instruction of Russian State Fishery Committee No.38-y of 06.12.99
9	Schedule of facsimile hydrometeorological radio transmissions	+	+		Need not be provided for ships engaged on international voyages (subject to availability of a facsimile)
10	Regulations on functional duties of radioelectronic officer	+			Approved by Order No.178 of 12.07.99 of Russian State Fishery Committee for ships of over 1800 gross tonnage
11	Instruction for radio operators on watch keeping to ensure safety at sea, and on maintaining GMDSS radiotelephone communication on fishing vessels	+	+	+	Approved by Order No.247 of 31.08.99 of Russian State Fishery Committee
12	Inventory of symbolic notations and list of officers of the Russian Federation State Fishery Committee, fishery associations, joint-stock companies, associations and organizations	+	+	+	Approved by Order No.297 of 19.10.99 of Russian State Fishery Committee
13	Guidelines on the use of Regulations 15 to 28 of the new Chapter V of SOLAS 74 in regard to Russian fishing vessels	+	+	+	Approved by Order No.141 of 25.03.02 of Russian State Fishery Committee
14	Interim guidelines for use by Maritime Mobile Service for fishing vessels operating in GMDSS sea areas A1 and A2		+	+	Approved by Order No.266 of 05.07.02 of Russian State Fishery Committee
15	Ship radio station log book (with regard to GMDSS)	+	+	+	The log book form was approved by Order No.19 of 02.02.99 of Russian State Fishery Committee
16	Document confirming registration of the COSPAS-SARSAT satellite emergency position-indicating radio beacons	+	+	+	Order No.329 of 22.11.99 of Russian State Fishery Committee. The document is issued by State Enterprise "Morsvyazsputnik"
17	Document confirming registration of the INMARSAT satellite radio equipment	+	+		Subject to availability of ship earth station. Order No.329 of 22.11.99 of Russian State Fishery Committee. The document is issued by State Enterprise "Morsvyazsputnik"
18	Ship radio station license (radio station operating permit)	+	+	+	Issued by Gossvyaznadzor
19	Operating regulations for GMDSS, navigational and hydroacoustic equipment fitted on fishing vessels	+	+		Approved by Order No.96 of 29.03.00 of Russian State Fishery Committee
20	Alphabetical list of call signs of ship radio stations of Russian fishing fleet	+	+		
21	Specifications and operation manuals for each type of radio communication and navigational equipment	+	+	+	Requirement of the Register
22	Design documentation for the installation of radio communication and navigational equipment as may be amended to take into account all the modifications introduced during operation	+	+	+	Ditto

¹ For the purposes of this List, fishing vessels are subdivided into three categories:
category 1 – ships of unrestricted service;
category 2 – ships of restricted area of navigation **R1**;
category 3 – ships of restricted areas of navigation **R2**, **R2-RSN**, **R3** and **R3-RSN**.

23. INSTRUCTIONS FOR VERIFICATION OF NAUTICAL CHARTS AND NAUTICAL PUBLICATIONS

Correcting of nautical publications in the Russian Federation is governed by the following normative documents issued by the Naval Hydrographic Service Head Office:

Regulations for Correcting, Compiling and Storing of Charts, Guidelines for the Operation of Civil Agencies' Ships (No. 9038), revision 1978;

the book "Symbols for Nautical Charts and Plans" (No. 9025), revision 1985;

Recommendations for Organizing the Duty of the Mate on Ministry of Maritime Fleet Ships (PIIC-88);
Guidelines on Organizing Duty of the Mate on River Ships, revision 1987.

New revisions of and large corrections to nautical charts and publications are undertaken only by the Office of the Naval Hydrographic Service Head.

Small corrections (hand-written corrections to nautical charts and publications in force) are made by hydrographic department correctors, shipowner's divisions (on the day of dispatch of charts and publications on board) and ship's navigating officers (in a systematic manner, on the day of receipt of "Notices to Mariners" and "Navigational Radio Notices to Mariners"). Navigating officers are to file all the Notices to Mariners and store them in the chart room.

Corrections made by hydrographic departments or shipowners' divisions are shown by stamps in the left-hand corner at the bottom of the chart, with the identification of the last Notice to mariners. After receipt of the charts on board, their corrections are to be made by ship's navigating officers. Notes of corrections made by ship's navigating officers are also to be put in the left-hand corner at the bottom of the chart. Some shipping companies put stamps to show that corrections have been made at the chart's free space. The numbers of all the Notices to Mariners against which corrections have been made are to be introduced in the stamp's columns. The last column is reserved for the signature of the person making the correction. At subsequent corrections on board, relevant notes in the stamp's columns are to be made by navigating officers.

When making small corrections to a chart or publication, navigating officers are to use symbols in accordance with the guidance contained in the book "Symbols for Nautical Charts and Plans". Replacement or withdrawal of inscriptions on charts is to be made by striking them out with a single fine line. If a symbol is cancelled, it is to be struck out by two fine lines. Temporary or seasonal corrections are to be made in pencil, while permanent corrections are to be made in red ink.

The procedure for making small corrections on board is as follows:

.1 upon receipt of a new Notice to Mariners or Navigational Radio Notice to Mariners, corrections are to be made without delay on every chart or publication subject to correction under the List of Charts and Publications Subject to Correction;

.2 the names and numbers of the documents against which corrections are made are to be identified on each chart;

.3 circled numbers of the charts corrected against a document, the correction date and the signature, are to be identified on every document against which corrections were made;

.4 the documents against which corrections were made are to be filed;

.5 if corrections were not made in a systematic manner (for example, if a ship was laid up or under repair), the navigating officer shall:

identify the date of the last large and small corrections, and, starting from that date, to make corrections due over the past year (years), i.e., to update the chart, where necessary. When making corrections, use is to be made of the "Inventory for Correcting Charts" for Notices to Mariners (the Inventory is used to select the numbers of the Notices to Mariners where corrections to specific charts were published);

if the chart was corrected by correctors from hydrographic departments or shipping companies' divisions, corrections shall be made against all the issues of the Notices to Mariners released after the number indicated on the corrector's stamp, beginning from the last one;

all the charts and publications shall be up-to-date as of the day when the ship departs on her voyage, bearing in mind that the Notices to Mariners or Nautical Radio Notices to Mariners are issued on a weekly basis.

To allow verification of compliance of the nautical charts and publications carried on board ships subject to the Register technical supervision with the requirements of national Maritime Administrations, below are the requirements of some Maritime Administrations for correcting nautical charts and publications, their availability on board and preparation prior to voyage.

The Republic of Azerbaijan

Nautical charts and publications are distributed among shipowners by the Naval Hydrographic Service of the Republic of Azerbaijan. The Service procures the nautical charts and publications through the Navigation and Oceanography Head Office of the Russian Federation Defense Ministry.

Prior to being supplied on board, the nautical charts and publications are forwarded from the Hydrographic Service storage facility to correctors' team for correcting. The corrections to the charts and publications are made against the Notices to Mariners issued by the Naval Hydrographic Service of the Republic of Azerbaijan. The Notices to Mariners are issued when changes occur in the navigational and hydrographic conditions in the sea area in question. According to an arrangement between the Caspian Fleet Hydrographic Service (Astrakhan) and the Naval Hydrographic Service of the Republic of Azerbaijan, there is reciprocal notification of changes in the navigational and hydrographic conditions and of publication of Notices to Mariners. Corrections are effective as changes in the navigational and hydrographic conditions occur. Shipowners are to supply ships with charts and publications covering the ships' area of navigation. The charts and publications carried on board are to be corrected by navigating officers against Notices to Mariners according to the regulations for correcting charts and publications.

The planned route shall be displayed on appropriate charts prior to each voyage.

The ships operating outside the Caspian Sea are to be provided with the charts and publications issued by the Navigation and Oceanography Head Office of the Russian Federation Defense Ministry.

Georgia

Notices to Mariners are issued by the Navigation and Oceanography Head Office on a weekly basis throughout the year (53 issues in all). Corrections to charts and publications are made by correctors' departments and by navigating officers on board. The corrections are valid until the release of the next Notice to mariners, and until the withdrawal of a Notice.

Georgian Shipping Company vessels are to be provided with charts and publications under Order No.52 of the State Maritime Inspectorate dated 3 June 1998.

Onboard corrections are to be made primarily for the passage, and then for the area of navigation.

The planned route shall be displayed on appropriate charts prior to each voyage.

Lithuania

ZAO "Shipping Services Centre", AO "LISCO" and AO "SENOYA BALTIA" make corrections to Russian nautical publications in the port of Klaipeda upon request by shipowners. ZAO "Shipping Services Centre" receives Notices to Mariners from Kaliningrad, while AO "LISCO", from St. Petersburg via computer. These organizations receive the information from the Navigation and Oceanography Head Office regarding the Baltic Sea from the same ports. AO "SENOYA BALTIA" makes corrections to charts and publications for small fishing vessels only, and it processes information regarding Lithuania's coastal line and maritime economic area.

The above organizations' personnel make corrections against Notices to Mariners, while corrections are made on board by navigating officers against Notices to Mariners and other publications by the Navigation and Oceanography Head Office and NAVTEX.

The scope of nautical publications carried on board shall satisfy both the intended voyage and the intended area of navigation. AB "Klaipėdos Transporto Laivynas" provides its ships with nautical publications having practically a world-wide coverage.

Preliminary route displaying is required only in the case of large ships.

Estonia

The Transportation Department issues Notices to Mariners on a monthly basis. In addition to the Notices to Mariners, urgent messages can be printed out upon request. Urgent messages are also transmitted via NAVTEX.

All the charts and publications for the intended voyage are to be corrected in accordance with the latest Notices to Mariners and NAVTEX urgent messages. Corrections are to be made by relevant organizations or by navigating officers on board. Other states' charts and publications are to be corrected in accordance with the national requirements of these states and national Notices to Mariners.

Under the Decree of the Estonian Ministry of Transport No. 40 dated 22 June 1998, the nautical charts and publications shall be updated, and the planned route shall be displayed on appropriate charts prior to each voyage.

The Netherlands

The nautical charts and publications shall be carried on board only for the intended voyage. These publications are to be corrected against the most recent Notices to Mariners as of current date, as far as practicable. Corrections to nautical charts and publications on board shall be made by navigating officers.

Poland

Corrections to nautical charts and publications shall be made on the basis of Notices. The Notices are published on a weekly basis.

The corrections are valid until the release of the next up-to-date Notice or until the release of a new chart or publication.

The scope of nautical publications to be carried on board shall satisfy one voyage (as a minimum, before the first port of call).

The planned route shall be displayed on a general chart for the entire voyage, while on the scale charts this shall be done as the need arises.

Corrections on board are to be made by the navigating officer in charge of charts and publications.

Turkmenistan

The Turkmen Sea Shipping Company does not deal with corrections to nautical charts, publications, or Notices to Mariners.

The required scope of nautical publications to be carried on board is determined by the ship's Administration on the basis of the ship's area of navigation.

Germany

The German Maritime Administration mainly uses Regulation A-VIII/2 of STCW 95:

the planned route shall be displayed on appropriate charts in the port of departure prior to the voyage;

all the charts necessary for the intended voyage shall contain accurate, complete and up-to-date information;

the corrections' period of validity shall take into account all the likely hazards of the area in question (for example, corrections to the German Bight charts are to be more frequent than the corrections to the open sea charts);

the scope of nautical publications to be carried on board depends on the area of navigation (ships shall carry all the nautical publications necessary to ensure safe navigation of the ship in the area in question);

NAVTEX messages shall be used prior to the voyage and during the voyage (IMO Resolution A.706 (17), Regulations V/12.1.46, V/4d of SOLAS 74);

the procedure for corrections depends on the German Navigational Service requirements;

the question of whom to charge with correcting nautical publications is at the sole discretion of the Master.

Sweden

Under the Decree of the Swedish Maritime Administration No. 1970.A.16, para 27, ships shall have appropriate up-to-date nautical charts and publications for the voyage.

The latest revision of the nautical publications shall be available. Swedish Notices to Mariners are released on a weekly basis by the Norrköping Hydrographic Committee.

In some other states, the frequency of Notices to Mariners is different, for example, 14 days in Finland and Norway.

Before last year, revisions of Swedish charts were published twice a year. However, since it is too expensive, now the new charts revisions are published as need arises, depending on the extent of corrections and the shipping intensity in the area covered by the chart, but not less than once a year.

Notices to Mariners shall be kept on board for 12 months.

The planned route shall be displayed on appropriate charts prior to each voyage.

The responsibility for corrections to charts against Notices to Mariners (annual/weekly) rests with the Maritime Administration (Shipping Department). Notes of corrections are made in the left-hand bottom corner of each Swedish chart. After corrections by the Maritime Administration, the responsibility for updating charts on board rests with the Master, and corrections are made to the charts prior to each voyage by second mate.

When verifying charts and publications under Reg. V/20 of SOLAS 74, The Register surveyor shall:

.1 verify that scope of the nautical charts and publications is adequate for the international voyage.

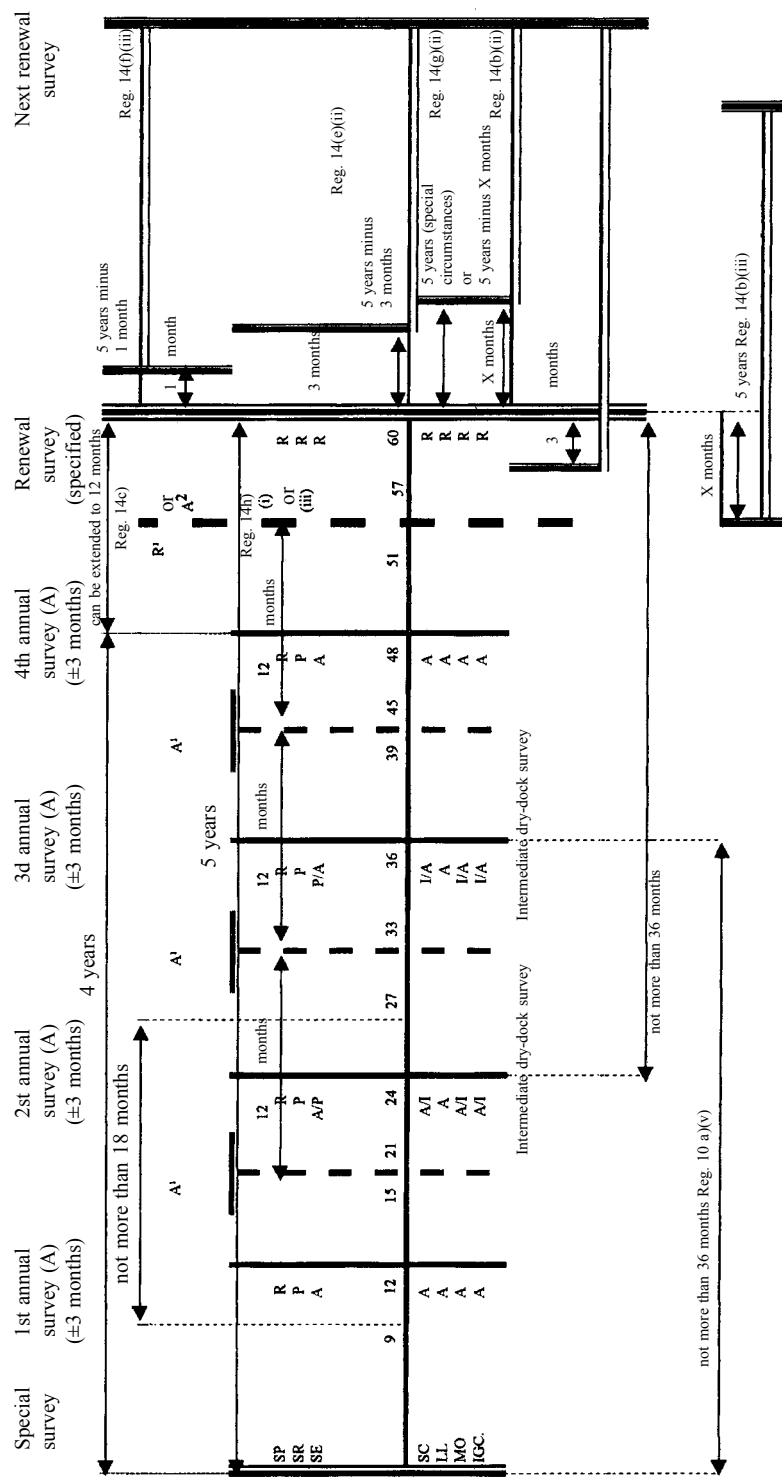
If the scope of the charts and publications is adequate only for navigation in a particular area (for example, only in the Baltic Sea), restrictions as to the area of navigation shall be included in the survey report (in this case, the ship is allowed to operate only in the Baltic Sea), or a requirement shall be imposed that the ship be provided with appropriate nautical publications in the last port of call for this area of navigation (for example, in the port of Rostock).

Considering that for ships of unrestricted service that are engaged on voyages throughout the world it is virtually impossible to foresee all the ports of call, it is recommended that they should be provided with charts and nautical publications having a word-wide coverage except for, possibly, the Polar regions. Ships of unrestricted service generally comply with this provision. It is to be taken into consideration that during ocean crossings route is displayed on grid charts which do not require corrections except for marking the areas prohibited for navigation (military drills, shooting exercises, launches and landings of space craft, etc.);

.2 verify that the nautical charts and publications are up-to-date.

If corrections to nautical charts and publications do not comply with the provisions of the above normative documents, Cargo Ship Safety Equipment Certificate shall not be endorsed/issued at annual or intermediate/renewal survey, or the Certificate shall be cancelled from the ship at an occasional survey, since this is a major deficiency (refer to 4.2.3.1.1 and 4.2.3.4.1.1.11 of Part III "Survey of Ships in compliance with International Conventions, Codes, Resolutions and Rules for the Equipment of Sea-Going Ships" of the Guidelines). When verifying nautical publications, it is to be taken into consideration that availability of electronic charts on board does not relieve the shipowner of the need for correcting conventional nautical charts except for the cases when the on-board electronic chart display and information system fully complies with the requirements of IMO resolution A.817(19), that shall be confirmed by the Register Type Approval Certificate. Such a system can be viewed as a means replacing updated paper nautical charts subject to the availability of an electronic charts base adequate for the intended voyage.

24. SHIP SURVEY SCHEME UNDER HARMONIZED SURVEY SYSTEM (INTERNATIONAL CONVENTIONS)



Symbols:

— (A) annual survey; A¹ — annual survey completed before the specified period which resulted in the amendment of the anniversary date (Reg. 14h)(i); A² — additional annual survey in the case the expiry date may remain unchanged provided one or more annual, intermediate or periodical surveys, as appropriate, are carried out so that the maximum intervals between the surveys prescribed by the relevant regulations are not exceeded (Reg. 14h)(iii)

I — intermediate survey; P — periodical survey for SR and SE.

— (R) specified renewal survey; R¹ — renewal survey completed before the specified period due to a new anniversary date

— actual renewal survey

— period of validity of new Certificate

— ±3 months' window for annual survey

— period between the specified and the actual renewal survey

25. SURVEY OF SHIPS CARRYING DANGEROUS GOODS IN PACKAGED FORM AND IN BULK

1 GENERAL

1.1 APPLICATION

1.1.1 This Annex is applied by the Register in technical supervision of ships in service carrying dangerous goods in packaged form and in bulk, including bulk materials possessing chemical hazards.

1.1.2 This Annex lays down the Register requirements for the construction, equipment and outfit of ships carrying dangerous goods in packaged form and in bulk. The provisions of this Annex shall not supersede the requirements of international conventions, national instructions and guidelines, or the Register Rules.

1.1.3 This Annex does not lay down requirements for packages, portable tanks, containers, marking, labelling and placarding, etc., required for the transport of dangerous goods, nor does it contain requirements for the issuance of shipping documents. The Annex does not contain any provisions for dangerous goods transportation techniques. Carriage of dangerous goods aboard ships is to meet the provisions of relevant regulations and instructions.

1.1.4 This Annex shall not apply to ship stores. The requirements for ship store-rooms containing flammable liquids, compressed gas cylinders, magazines, etc., are set out in relevant parts of the Rules for the Classification and Construction of Sea-Going Ships.

1.2 DEFINITIONS AND EXPLANATIONS

1.2.1 For the purpose of this Annex, the following definitions are used.

Flammable liquid is liquid capable of supporting combustion after the source of ignition has been removed, and having a flashpoint of not more than 61 °C.

Bulk cargo is any material or substance, other than liquid or gas, which is loaded directly into the cargo spaces of a ship without any intermediate form of containment. Such cargoes also include materials or substances loaded directly into a shipborne barge stowed aboard a barge-carrying ship.

Group A (bulk cargo) consists of cargoes which may liquefy if shipped at a moisture content in excess of their transportable moisture limit.

Group B (bulk cargo) consists of cargoes which possess a chemical hazard which could give rise to a dangerous situation on a ship.

Group C (bulk cargo) consists of cargoes which are neither liable to liquefy (Group A) nor to possess chemical hazard (Group b).

Dangerous goods means the substances, materials and articles covered by IMDG Code.

Flashpoint is the lowest temperature of the liquid at which its vapour forms an ignitable mixture with air. A flammable liquid cannot be ignited so long as its temperature remains below the flashpoint.

Bulk cargoes which may possess a chemical hazard are bulk cargoes which may possess a chemical hazard during transport, because of their chemical nature or properties. Such cargoes are listed in Appendix 1 to IMSBC Code and are classified as Group B of IMSBC Code under Regulation VII/2 of SOLAS-74, or as "materials hazardous only in bulk" (MHB).

Segregation of dangerous goods:

"Away from" means effectively segregated so that the dangerous goods may be transported in a cargo compartment or on deck, providing a minimum horizontal separation of 3 metres is obtained;

"Separated from" means in different compartments or holds when stowed under deck. For on deck stowage, this segregation means a separation by a distance of at least 6 metres horizontally;

"Separated by a complete compartment or hold from" means either a vertical or a horizontal separation. For on deck stowage, this segregation means a separation by a distance of at least 12 metres horizontally;

"Separated longitudinally by an intervening complete compartment or hold from" means that between a package under deck and one on deck, a minimum distance of 24 metres, including a complete compartment, shall be maintained longitudinally. Vertical separation alone does not meet this requirement. For on deck stowage, this segregation means a separation by a distance of at least 24 metres longitudinally.

1.2.2 For the purpose of this Annex the following abbreviations are used.

IMSBC Code is International Maritime Solid Bulk Cargoes Code adopted by IMO resolution MSC.268(85) as amended by IMO resolutions MSC.318(89), MSC.354(92), MSC.393(95), MSC.426(98);

INF Code is International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships adopted by IMO Resolution MSC.88(71).

IMDG Code is the International Maritime Dangerous Goods Code adopted by IMO resolutions MSC.122(75) as amended, MSC.157(78), MSC.205(81), MSC.262(85), MSC.294(87), MSC.328(90), MSC.372(93), MSC.406(96), MSC.442(99).

MOPOG Rules are Rules for the Transport of Dangerous Goods by Sea (PJ31.15.01-89).

NG Rules are Rules for the Safe Carriage by Sea of Bulk Cargoes (CTO 318.1.26-2006).

1.3 CLASSIFICATION AND DEFINITIONS OF CLASSES OF DANGEROUS GOODS

1.3.1 Under IMDG Code and Regulation VII/2 of SOLAS 74, dangerous goods are divided into the following classes:

1 – explosives;

2 – gases: compressed, liquefied or dissolved under pressure;

3 – flammable liquids¹;

4 – flammable solids, substances liable to spontaneous combustion, and substances, which, in contact with water, emit flammable gases;

4.1 – flammable solids;

4.2 – substances liable to spontaneous combustion;

4.3 – substances, which, in contact with water, emit flammable gases;

5 – oxidizing substances and organic peroxides;

5.1 – oxidizing substances;

5.2 – organic peroxides;

6 – toxic and infectious substances;

6.1 – toxic substances;

6.2 – infectious substances;

7 – radioactive materials;

8 – corrosives;

9 – miscellaneous dangerous substances and articles.

Marine pollutants and wastes.

The substances assigned to classes 1 – 9 are deemed as being marine pollutants (refer to Chapter 2.10 of IMDG Code).

¹ "Flammable" has the same meaning as inflammable".

For packing purposes, substances other than those of classes 1, 2, 5.2, 6.2 and 7, and other than self-reactive substances of class 4.1 are assigned to three packing groups in accordance with the degree of danger they present:

packing group I: substances presenting high danger;

packing group II: substances presenting medium danger and

packing group III: substances presenting low danger.

1.3.2 Class 1 is subdivided into 6 hazard classes:

class 1.1 – substances and articles which have a mass explosion hazard;

class 1.2 – substances and articles which have a projection hazard but not a mass explosion hazard;

class 1.3 – substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard;

class 1.4 – substances and articles which present no significant hazard.

Substances and articles of class 1.4 are in compatibility group S if they are so packaged or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast or projection effects are limited to the extent that they do not significantly hinder or prohibit fire-fighting or other emergency response efforts in the immediate vicinity of the package;

class 1.5 – very insensitive substances which have a mass explosion hazard;

class 1.6 – extremely insensitive articles which do not have a mass explosion hazard.

1.3.3 Class 2 includes the substances which:

at 50 °C has a vapour pressure greater than 300 kPa, or

are completely gaseous at 20 °C at standard pressure of 101,3 kPa.

Class 2 is subdivided into:

class 2.1 – flammable gases;

class 2.2 – non-flammable, non-toxic gases;

class 2.3 – toxic gases.

1.3.4 Class 3 includes liquids, or mixtures of liquids, or liquids containing solids in solution or suspension (such as paints, varnishes, lacquers, etc., but not including substances which, on account of their other dangerous characteristics, have been included in other classes) which give off a flammable vapour at or below 60 °C closed-cup test (corresponding to 65,6 °C open-cup test), normally referred to as the "flashpoint".

Class 3 is divided into groups in accordance with the requirements of 2.3.0 of IMDG Code:

group I – group of liquids with low flashpoint;

group II – group of liquids with flashpoint below (not inclusive) 23 °C based on closed-cup method;

group III – group of liquids with flashpoint from 23 to 60 °C inclusive based on closed-cup method.

1.3.5 Class 4 deals with substances, other than those classified as explosives, which, under conditions of transport, are readily combustible or may cause or contribute to a fire.

Class 4 is subdivided into:

class 4.1 – flammable solids and solids which may cause fire through friction, self-reactive substances (solids and liquids), substances similar to self-reactive substances, desensitized explosives. This class comprises solids that can be easily ignited by contact with an external ignition source such as sparks or flame, and that are readily combustible or may cause fire through friction. This class also comprises self-reactive and similar substances (i.e. which are liable to undergo a strongly exothermic decomposition under standard or elevated temperatures due to excessively high transportation temperatures or through contamination), and desensitized explosives, which may explode if not diluted sufficiently;

class 4.2 – substances liable to spontaneous combustion. This class comprises both solid and liquid substances, which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up in contact with air, and being then liable to catch fire;

class 4.3 – substances which, in contact with water, emit flammable gases. This class comprises both solid and liquid substances, which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities. "Water-reactive" substances are those substances, which, in contact with water, emit flammable gases.

1.3.6 Class 5 is subdivided into:

class 5.1 – oxidizing substances. Substances which, while in themselves not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material they are in contact with;

class 5.2 – organic peroxides. These are thermally unstable substances which may undergo exothermic self-accelerating decomposition. In addition, they may have one or more of the following properties: be liable to explosive decomposition; burn rapidly; be sensitive to impact or friction; react dangerously with other substances; cause damage to the eyes.

1.3.7 Class 6 is subdivided into:

class 6.1 – toxic substances. These are substances liable either to cause death or serious injury or to harm human health if swallowed or inhaled, or by skin contact.

class 6.2 – infectious substances. These substances contain viable micro-organisms or their toxins which are known or suspected to cause infectious disease in animals or humans.

1.3.8 Class 7 comprises materials containing radionuclide where both the activity concentration and the total activity in the consignment exceed the values specified in 2.7.7.2.1 – 2.7.7.2.6 of the IMDG Code.

1.3.9 Class 8 comprises solid and liquid substances that possess in their original state the common property of being able more or less severely to damage living tissue. In the case of leakage of such substance from the package, it may also damage other goods or the vessel.

1.3.10 Class 9 comprises:

substances and articles not covered by other classes which experience has shown, or may show, to be of a dangerous character. This class also comprises substances that are transported or offered for transport at temperatures equal to, or exceeding, 100 °C, in a liquid state, and solids that are transported or offered for transport at temperatures equal to or exceeding 240 °C;

harmful substances that are marine pollutants.

1.3.11 Marine pollutants – substances specified in Annex III to MARPOL 73/78 as amended.

1.3.12 Certain substances and materials do not present a significant hazard when transported in packaged form. When carried in bulk, however, they present significant hazards, and specific precautions need to be taken as required by entries for the cargo in Appendix 1 to IMSBC Code. These substances and materials are classified as hazardous only in bulk (MHB).

1.3.13 The classification of dangerous goods according to the MOPOG Rules differs from the classification adopted in the IMDG Code. The classes of danger are listed in the second volume of the MOPOG Rules.

2 REQUIREMENTS FOR SHIPS CARRYING DANGEROUS GOODS IN PACKAGED FORM AND IN BULK, AND BULK CARGOES POSSESSING CHEMICAL HAZARDS

2.1 SPECIAL REQUIREMENTS FOR SHIPS CARRYING DANGEROUS GOODS OF CLASSES 1, 2.1, 2.2, 2.3, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 8 AND 9

2.1.1 The requirements in this Section cover the following types of ships and cargo spaces:

.1 ships and cargo spaces not specifically designed for the carriage of containers, but intended for the carriage of dangerous goods in packaged form, including goods in containers and portable tanks;

.2 purpose-built containerships and cargo spaces intended for the carriage of dangerous goods in containers and portable tanks;

.3 ro-ro ships and ro-ro spaces (including special category spaces and vehicle deck spaces) intended for the carriage of dangerous goods;

.4 ships and cargo spaces intended for the carriage of solid dangerous goods in bulk;

.5 ships and cargo spaces intended for carriage of dangerous goods other than liquids and gases in bulk in shipborne barges.

Cargo ships of less than 500 gross tonnage shall comply with the requirements in this Chapter, but the requirements may be reduced, of which a statement is to be made in the Certificate issued by the Register.

2.1.2 Depending on the mode of carriage of dangerous goods, the requirements of Table 2.1.2-1 are to be complied with. Depending on the class of solid dangerous goods in bulk, the requirements in Table 2.1.2-2 are to be complied with. Depending on the class of dangerous goods except dangerous solid goods in bulk, the requirements of Table 2.1.2-3 are to be complied with.

Table 2.1.2-1

Ships and cargo spaces

Paragraph No.	Weather decks of ships and cargo spaces (see 2.1.1.1 to 2.1.1.5 inclusive)	Ships and cargo spaces that are not specially designed (see 2.1.1.1)	Container cargo spaces (see 2.1.1.2)	Closed cargo spaces ¹ (see 2.1.1.3)	Open cargo spaces (see 2.1.1.3)	Solid dangerous goods in bulk (see 2.1.1.4)	Shipborne barges (see 2.1.1.5)
2.1.4.1	X	X	X	X	X	For application of requirements of 2.1 to different classes of dangerous goods, see table 2.1.2-2	X
2.1.4.2	X	X	X	X	X		—
2.1.4.3	—	X	X	X	X		X
2.1.4.4	—	X	X	X	X		X
2.1.5	—	X	X	X	X		X ²
2.1.6	—	X	X	X	—		X ²
2.1.7.1	—	X	X ³	X	—		X ²
2.1.7.2	—	X	X ³	X	—		X ²
2.1.8	—	X	X	X	—		—
2.1.9.1	X	X	X	X	X		—
2.1.9.2	X	X	X	X	X		—
2.1.10	X	X	—	—	X		—
2.1.11	X	X	X ⁴	X	X		—
2.1.12	—	—	—	X ⁵	X		—
2.1.13 и 2.1.1.14	—	—	—	X	—		—

¹ Special category spaces shall be treated as closed ro-ro spaces when dangerous goods are carried.

² In the special case where the barges are capable of containing flammable vapours or alternatively if they are capable of discharging flammable vapours to a safe space outside the barge carrier compartment by means of ventilation ducts connected to the barges, these requirements may be reduced or waived on agreement with the Register.

³ For classes 4 and 5.1 solids not applicable to closed freight containers. For classes 2, 3, 6.1 and 8 when carried in closed freight containers, the ventilation rate may be reduced to not less than two air changes per hour. For classes 4 and 5.1 liquids when carried in closed freight containers, the ventilation rate may be reduced to not less than two air changes per hour; for the purpose of this requirement, a portable tank is a closed freight container.

⁴ Applicable to decks only.

⁵ Applicable only to closed ro-ro spaces, not capable of being sealed.

Note: Where "X" appears in the table, it means this requirement is applicable to all classes of dangerous goods as given in the appropriate line of Table 2.1.2-3 except as indicated by the notes.

2.1.3 Cargo spaces intended for the carriage of dangerous goods in packaged form and in bulk shall be fitted with a fixed fire-extinguishing system that can be a carbon dioxide smothering system or an inert gas system complying with the requirements of Section 3, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships, or with a fire-extinguishing system giving equivalent protection of the cargo carried, having regard to the following:

.1 the requirement above need not be fulfilled if the ship is intended solely for the carriage of solid bulk cargoes which are non-combustible or constitute a low fire risk (see Table 1 of Appendix 1). The ship shall be fitted with steel hatch covers and effective closing appliances for all ventilators and other openings leading to cargo spaces. The ship shall be issued with an Exemption Certificate with a list of cargo allowed for carriage attached to it as appropriate;

.2 for dangerous solid bulk cargoes of classes 5.1 and 9 for which a fixed gas fire-extinguishing system is not effective (see Table 2 of Appendix 1), equivalent protection shall consist in the fulfillment of requirements 2.1.4.1 and 2.1.4.2;

.3 open ro-ro cargo spaces having a deck above them and closed ro-ro cargo spaces not capable of being sealed shall be fitted with a fixed pressure water-spraying system as per 2.1.12 in lieu of the gas fire-extinguishing system.

Table 2.1.2-2

Classes of dangerous goods

Paragraph No.	4.1	4.2	4.3 ¹	5.1	6.1	8	9
2.1.4.1	X	X	—	X	—	—	X
2.1.4.2	X	X	—	X	—	—	X
2.1.5	X	X ²	X	X ³	—	—	X ³
2.1.7.1	—	X ²	X	—	—	—	—
2.1.7.2	X ⁴	X ²	X	X ^{2,4}	—	—	X ^{2,4}
2.1.7.3	X	X	X	X	X	X	X
2.1.9	X	X	X	X	X	X	X
2.1.11	X	X	X	X ²	—	—	X ⁵

¹ The hazards of substances in this class, which may be carried in bulk are such that special consideration shall be given to the construction and equipment of the ship involved in addition to meeting the requirements enumerated in this Table.

² Only applicable to seedcake containing solvent extractions, to ammonium nitrate and to ammonium nitrate fertilizers.

³ Only applicable to ammonium nitrate and to ammonium nitrate fertilizers.

⁴ Only suitable wire mesh guards are required.

⁵ The requirements of IMSBC Code are sufficient.

Table 2.1.2-3

Classes of dangerous goods

Class	Para re-quire-ments	1.1 – 1.6	1.4S	2.1	2.2	2.3 flammable ¹	2.3 non-flammable	3 flash point ² <23 °C	3 flash point ² ≥ 23 °C to ≤60 °C	4.1	4.2	4.3 liquids ³	4.3 solids	5.1	5.2 ⁴	6.1 liquids flash point ² < 23 °C	6.1 liquids flash point ² ≥ 23 °C to ≤60 °C	6.1 liquids	6.1 solids	8 liquids flash point ⁵ < 23 °C ⁵	8 liquids flash point ⁵ ≥ 23 °C to ≤60 °C	8 liquids	8 solids	9
2.1.4.1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2.1.4.2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—
2.1.4.3	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2.1.4.4	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2.1.5	X	—	—	X	—	X	—	X	—	—	—	X ⁵	—	—	—	X	—	—	—	X	—	—	—	X ⁶
2.1.6	X	X	X	X	X	—	X	X	X	X	X	X	X	X	—	X	X	X	X	X	X	X	X	—
2.1.7.1	—	—	—	X	—	—	X	X	—	X ⁷	X ⁷	X	X	X ⁷	—	X	X	—	X ⁷	X	—	—	—	X ⁷
2.1.7.2	—	—	—	X	—	—	—	X	—	—	—	—	—	—	—	X	X	X	—	X	—	—	—	X ⁶
2.1.8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	X	X	—	X	—	—	—	—
2.1.9	—	—	—	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X ⁹
2.1.10	—	—	—	—	—	—	—	X	X	X	X	X	X	X	—	X	X	X	—	X	—	—	—	—
2.1.11	X ¹⁰	—	—	X	X	X	X	X	X	X	X	X	X	X ¹¹	X	X	X	—	—	X	X	—	—	—
2.1.12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2.1.13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2.1.14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

¹Under the provisions of IMDG Code, stowage of class 2.3 dangerous goods having subsidiary risk class 2.1 under deck or in enclosed ro-ro spaces is prohibited.

²Refer to the flash point.

³Under the provisions of IMDG Code, stowage of class 4.3 liquids having flash point less than 23° under deck or in enclosed ro-ro spaces is prohibited.

⁴Under the provisions of IMDG Code, stowage of class 5.2 dangerous goods under deck or in enclosed ro-ro spaces is prohibited.

⁵Only applicable to dangerous good having a flash point less than 23 °C listed in IMDG Code.

⁶Only applicable to dangerous goods evolving flammable vapor listed in IMDG Code.

⁷When "mechanically-ventilate spaces" are required by IMDG Code.

⁸Only applicable to dangerous goods having a subsidiary risk class 6.1.

⁹As appropriate for the goods to be carried.

¹⁰Stow 3 m horizontally away from the machinery space boundaries in all cases.

¹¹Refer to IMDG Code.

2.1.4 Water supply to cargo spaces and to the weather deck where dangerous goods are carried is to take into account the following additional requirements:

.1 arrangements shall be made to ensure immediate availability of a supply of water from the fire main either by permanent pressurization or by remote arrangements for the fire pumps placed on the navigation bridge or in a continuously manned space. Water supply to the fire main shall be available without additional shut-off valves being opened;

.2 the quantity of water delivered shall be capable of supplying four nozzles provided on board, capable of being trained on any part of the cargo space when empty and the weather deck at a pressure not less than that indicated in Table 3.2.1.1, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships. The following provisions are to be complied with:

.2.1 the capacity requirement is to be met by the total capacity of the main fire pump(s) not including the capacity of the emergency fire pump;

.2.2 fire nozzles used to deliver water to cargo spaces shall be of an approved dual-purpose type (i.e., spray/jet type) incorporating a shutoff;

.2.3 the number and location of fire hydrants shall be such as to allow the delivery of at least two jets of water supplied by non-detachable hoses of standard length to any part of an empty cargo space, and four jets of water, to any part of the ro-ro cargo space;

.2.4 the ships the keels of which were laid on or after 1 July 2002 shall be fitted with three additional hoses and three additional fire nozzles;

.3 means shall be provided for effectively cooling the designated under deck cargo space with water. The flow rate is to be at least 5 l/min per square metre of the horizontal area of cargo spaces. The water may be supplied either by a fixed arrangement of spraying nozzles or by flooding the cargo space with water. Moreover, the following requirements are to be complied with:

.3.1 hoses may be used for this purpose in small cargo spaces and in small areas up to 100 m² of larger cargo spaces;

.3.2 the cargo space drainage and pumping arrangements shall be such as to prevent the build-up of free surfaces. The drainage system shall be sized to remove no less than 125 per cent of the combined capacity of both the water spraying system pumps and the four fire hose nozzles of the water fire main system. The drainage system valves shall be operable from outside the protected space at a position in the vicinity of the extinguishing system controls. Bilge wells shall be of sufficient holding capacity and shall be arranged at the side shell of the ship at a distance from each other of not more than 40 m in each watertight compartment;

.3.3 if fulfillment of the requirements of 2.1.4.3.2 is impossible, the Register is to be provided with calculations of the adverse effect upon stability of the added weight and free surface of water, in compliance with the requirements of Part V "Subdivision" of the Rules for the Classification and Construction of Sea-Going Ships;

.4 provision to flood a designated under-deck cargo space with suitable specified media may be substituted for the requirements of 2.1.4.3;

.5 the total required capacity of the water supply shall satisfy the requirements of 2.1.4.2 and 2.1.4.3, if applicable, simultaneously calculated for the largest designated cargo space. If a drencher system is used to satisfy the requirements of 2.1.4.3, the drencher pump shall also be taken into account in this total capacity calculation.

2.1.5 Electrical equipment and wiring shall not be fitted in enclosed cargo spaces or vehicle spaces unless it is essential for operational purposes. Moreover, the following requirements are to be complied with:

.1 if electrical equipment is fitted in enclosed cargo spaces or vehicle spaces, it shall be of a certified safe type for use in the dangerous environments to which it may be exposed (see Appendix 3);

.2 the requirement of 2.1.5.1 need not be complied with if it is possible to completely isolate the electrical system by removal of links in the system, other than fuses. Such isolation is not to result in the isolation of the electrical equipment that is required to be operative during cargo-handling operations and carriage of cargo, and to ensure safe control of the ship;

.3 cable penetrations of the decks and bulkheads are to be sealed against the passage of gas or vapour;
.4 through runs of cables and cables within the cargo spaces are to be protected against damage from impact;

.5 any other potential sources of ignition or heat (for instance, steam pipelines, heated fuel oil tanks, etc.) are not allowed in cargo spaces or adjacent spaces. However, if sources of heat are needed for operational or structural reasons, provisions are to be made to prevent the temperature of their external surfaces on the cargo spaces side from exceeding 50 °C;

.6 the design of hatch covers in the cargo spaces specified in 2.1.1.1 shall be such as to preclude spark formation during opening and closing operations by the use of such materials for contacting surfaces of moving parts that do not constitute a spark-forming couple. The design of the hatch cover drives shall comply with the requirements of 7.10.8.6, Part III "Equipment, Arrangements and Outfit" of the Rules for the Classification and Construction of Sea-Going Ships. This requirement for the design of hatch covers and their drives is not applicable when cargoes are carried in closed containers.

2.1.6 Ro-ro spaces shall be fitted with a fixed fire detection and fire alarm system complying with the requirements of 4.2.1, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships. All other types of cargo spaces shall be fitted with either a fire detection and fire alarm system complying with the requirements of 4.2.1, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships or a sample extraction smoke detection system complying with the requirements of 4.2.1.6 of the same Part.

2.1.7 Ventilation of the cargo spaces is to comply with the following additional requirements:

.1 adequate power ventilation shall be provided in enclosed cargo spaces complying with the following requirements:

.1.1 the arrangement shall be such as to provide for at least six air changes per hour in the cargo space, based on an empty cargo space;

.1.2 the ventilation system shall provide for removal of vapours and gases from the upper or lower parts of the cargo spaces, depending on the density of the cargo vapours relative to the air. When the goods to be carried are dangerous goods of classes 2.1 and 2.3 which are lighter than air, and dangerous goods of class 4.3 liable to give off such vapours, the intakes of the ventilation system are to be located in the upper part of the cargo spaces. For the carriage of other types of dangerous goods, the intakes are to be located in the lower part of the cargo spaces;

.1.3 for open-top containerships, power ventilation shall be required only for the lower part of the cargo spaces, and the ventilation capacity may be reduced to two air changes per hour, based on the empty hold volume below weather deck;

.1.4 for the carriage in bulk of dangerous goods of class 4.3 and seedcake of class 4.2 containing solvent extractions, two separate fans shall be permanently fitted, each providing not less than three air changes per hour, based upon the empty space volume. Ventilation shall be such that any gases escaping from cargo spaces cannot reach accommodation, service and machinery spaces;

.2 the fans shall be explosion proof or arranged such that the escaping gas flow is separated from electrical cables and components, and, moreover, they are to comply with the requirements of 5.3.3, Part IX "Machinery" of the Rules for the Classification and Construction of Sea-Going Ships. Suitable wire mesh guards having a size of 13 mm x 13 mm are to be fitted over inlet and outlet ventilation openings;

.3 natural ventilation ensuring effective ventilation over the surface of the bulk cargo shall be provided in enclosed cargo spaces intended for the carriage of solid dangerous goods in bulk, where there is no provision for mechanical ventilation;

.4 if adjacent spaces are not separated from cargo spaces by gastight bulkheads, ventilation requirements are to apply as for the cargo space itself;

.5 ventilation ducts leading to cargo spaces intended for the carriage of sulphur, hay, straw, bhusa and dry natural fibre (dry cotton, flax, hemp, jute, kapok, sisal) of class 4.1 shall be fitted with wire guards of small mesh to prevent entry of sparks into the cargo spaces. All the other openings, entrances and hatchways leading to such cargo spaces are to be fitted with effective closing appliances.

2.1.8 The bilge system of cargo spaces is to comply with the following additional requirements:

.1 the bilge system shall be designed to protect against inadvertent pumping of liquids from cargo spaces through machinery space piping or pumps. Provision shall be made for isolating the bilge line into the machinery space either by fitting a blank flange or by a closed lockable valve;

.2 the additional separate fixed bilge system for cargo spaces shall comply with the following requirements:

.2.1 the capacity of the system shall be not less than 10 m³/h per cargo space served, however, it need not exceed 25 m³/h;

.2.2 enclosed spaces containing bilge pumps and pipes serving cargo spaces shall be fitted with separate mechanical ventilation complying with the requirements of 2.1.7.1.1 and 2.1.7.2. If the space has access from another enclosed space, the door shall be gas-tight and self-closing;

.2.3 if bilge drainage of cargo spaces is arranged by gravity drainage, the drainage shall be either led directly overboard or to a closed drain tank located outside the machinery spaces. The tank shall be provided with a vent pipe to a safe location on the open deck;

.2.4 drainage from a cargo space into bilge wells in a lower space is only permitted if that space satisfies the same requirements as the cargo space above.

2.1.9 Provision on board shall be made for the following additional personnel protection:

.1 four sets of full protective clothing, resistant to chemical attack. The protective clothing shall cover all skin, so that no part of the body is unprotected. The protective clothing shall be capable of being used for emergency purposes taking into account the danger of the chemicals according to the class and liquid or gaseous state and shall comply with the recommendations of IMSBC Code and IMDG Code;

.2 at least two self-contained breathing apparatuses additional to those required by Table 5.1.2, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships;

.3 ships the keels of which were laid on or after 1 September 1984 shall be fitted with two spare charges for each required apparatus. Passenger ships carrying not more than 36 passengers that are equipped with means for fully recharging the air cylinders free from contamination need carry only one spare charge for each required apparatus.

2.1.10 Portable fire extinguishers with a total capacity of at least 12 kg of dry powder or equivalent shall be provided for the cargo spaces. These extinguishers shall be in addition to any extinguishers required by Section 5, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships.

Use of other types of fire extinguishers in lieu of powder extinguishers is not allowed unless the ship is used for the carriage of only those dangerous goods for which the extinguishing medium in the fire extinguishers is recommended.

2.1.11 Bulkheads forming boundaries between cargo spaces and machinery spaces of category A are to be insulated to "A-60" class standard, unless the dangerous goods are stowed at least 3 m away from such bulkheads. Other boundaries between such spaces shall be insulated to "A-60" class standard.

A cargo space at least partially located above a machinery space of category A, whose boundaries are not insulated to "A-60" standard, does not comply with the requirements for the carriage of dangerous goods. This requirement also covers the portions of weather decks located above machinery spaces of category A.

2.1.12 Each open ro-ro cargo space having a deck above it and each space deemed to be a closed ro-ro space not capable of being sealed are to be fitted with a Register-approved fixed pressure water-spraying system for manual operation which shall protect all parts of any deck and vehicle platforms in the space. The Register may permit the use of any other fixed fire-extinguishing system that has been shown by full-scale test to be no less effective.

The requirements of 2.1.4.3.2 and 2.1.4.3.3 are also to be complied with.

2.1.13 In ships having ro-ro spaces, a separation shall be provided between a closed ro-ro space and an adjacent open ro-ro space. The separation shall be such as to minimize the passage of dangerous vapours and liquids between such spaces. Alternatively, such separation need not be provided if the ro-ro space is considered to be a closed cargo space over its entire length and fully complies with the relevant

special requirements of this Chapter.

2.1.14 In ro-ro ships, a separation shall be provided between a closed ro-ro space and the adjacent weather deck. The separation shall be such as to minimize the passage of dangerous vapours and liquids between such spaces. Alternatively, a separation need not be provided if the arrangements of the closed ro-ro spaces are in accordance with those required for the dangerous goods carried on adjacent weather deck.

2.1.15 Ships carrying packaged dangerous goods shall be suitably equipped for the stowage and securing of cargoes based on their properties (refer to 1.2.2, Chapter 1 of the Guidelines on Drawing Up Cargo Securing Manuals).

2.1.16 Dangerous goods shall be capable of being stowed on board so as to provide unobstructed passages and access to any appliances required for safe operation of the ship and for emergency response. When determining the compliance of a weather deck for the carriage of dangerous goods, consideration shall be given to the arrangements and construction of auxiliary machinery, electrical equipment and cable runs to avoid sources of ignition, and to ensure unobstructed approach to fire hydrants, sounding pipes, etc.

2.1.17 Cargo handling gear for the loading, discharge and handling of dangerous goods shall comply with the requirements of 1.5.2.9 of the Rules for the Cargo Handling Gear of Sea-Going Ships.

2.1.18 Ships carrying self-reactive substances of class 4.1 (UN 3231 – 3240) and organic peroxides of class 5.2 (UN 3111 – 3120) shall be fitted with suitable means for supporting the operation of refrigerating equipment of cargo transport units under the requirements of Chapter 7.7 of IMDG Code.

2.1.19 Ships carrying dangerous goods of classes 4.1 and 5.2 having a subsidiary risk of class 1 shall comply with the requirements for ships carrying goods of class 1.3.

2.1.20 Cargo spaces intended for the carriage of seed cake, UN 1386, copra, UN 1363, ferrous metal borings, UN 2793, fishmeal, UN 1374 and 2216, shall be provided with devices to measure cargo temperature during transport.

2.1.21 In ships carrying dangerous goods of classes 4.2, 5.1 and 9, such as: ammonium nitrate, UN 1942, ammonium nitrate based fertilizers, UN 2067-2071, and nitrates, UN 1446 – 1499, the hatch covers of cargo spaces shall be capable of being opened in the event of fire to ensure maximum ventilation and use of large amounts of water for fire extinguishing in the cargo space; account shall be taken of possible loss the ship's stability due to cargo space flooding. Assessment of the ship's stability for the case of cargo compartment flooding shall be made also for the carriage of aluminium smelting by-products or aluminium remelting by-products UN 3170 and direct-reduced iron (B) and (C). Stability calculations are to comply with the requirements of Part V "Subdivision" of the Rules for the Classification and Construction of Sea-Going Ships.

2.1.22 Ships carrying dangerous goods shall be provided with common absorbent materials, such as sawdust (sometimes, sand). However, when IMDG Code Emergency Schedules recommend the use of inert absorbent materials, provision shall be made for diatomite or other equally effective absorbent materials, especially for substances contacting with water.

2.1.23 Ships carrying dangerous goods of class 1 (except for division 1.4S) shall meet the following additional requirements:

.1 the cargo spaces holding dangerous goods of class 1 shall not be located directly above or below accommodation and service spaces;

.2 a lightning conductor, earthed to the sea, shall be provided on any mast or structure, unless effective electrical bonding is provided between the sea and the mast of structure from its extremity and throughout to the main body of the hull structure. Steel masts in ships of all-welded construction may be considered to comply with this requirement;

.3 the weather deck shall be deemed in compliance for the carriage of dangerous goods of class 1 provided that the cargoes are not stowed at a distance less than:

.3.1 6 m away from any naked flame, machinery space exhaust gas pipes, boiler uptakes, incinerators and galleys, store-rooms for flammable materials and substances, and other potential sources of ignition;

.3.2 3 m away from any appliances required to ensure safe ship operation, as well as from fire hydrants, having regard to the need for unobstructed passages and access to these appliances;

.3.3 8 m away from the navigation bridge, accommodation spaces and life-saving appliances.

The distances mentioned above shall be measured horizontally and projected vertically;

.4 provision shall be made on board for soft brushes and plastic pans for collecting spillages and for non-sparking footwear, i.e. not having iron or steel external parts.

2.1.24 Ships whose exhaust gas pipes and smoke uptakes of main and auxiliary engines, boilers and incinerators are not fitted with spark arresters may only be allowed to carry dangerous goods of classes 1, 2.1, 3.1, 3.2, 4.1, 4.2, 4.3, 5.2, 6.1 (liquids with flashpoint ≤ 23 °C) and 8 (liquids with flashpoint ≤ 23 °C) in closed containers or in cargo spaces and on deck areas that are beyond the reach of sparks.

2.2 REQUIREMENTS FOR SHIPS CARRYING BULK MATERIALS POSSESSING CHEMICAL HAZARDS

2.2.1 Requirements for chemical dangerous bulk cargoes are given in cards to IMBC Code for each particular cargo. Information given below and in table 2.2.1 is for reference only. To some cargoes in accordance with table 2.2.1, unless other is stated in IMDG Code, the following requirements shall apply to:

.1 cargo spaces shall be fitted with a fixed carbon dioxide or inert gas fire-extinguishing system complying with the requirements of Section 3, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships, or with a fire extinguishing system giving equivalent protection of the cargo carried;

.2 the ship shall be fitted with steel hatch covers and effective closing appliances for all ventilators and other openings leading to cargo spaces. On ships the keels of which were laid or which were in the same stage of constructions on 1 January 2005 or after this date, the steel hatches of cargo compartments shall comply with the requirements of 7.10.8, Part III, "Equipment, Arrangements and Outfit" of the Rules for the Classification and Construction of Sea-Going Ships;

.3 arrangements shall be made to ensure availability of a large supply of water to the cargo spaces for fire fighting purposes through the fulfillment of the requirements of 2.1.4.1, 2.1.4.2.1-2.1.4.2.3 and 2.1.21;

.4 there shall be no sources of ignition in cargo spaces and spaces having openings into cargo spaces through the fulfillment of the requirements of 2.1.5;

.5 cargo spaces shall have power ventilation providing for at least six air changes per hour based on an empty cargo space volume and for removal of vapours and gases from the upper part of the cargo space;

.6 mechanical ventilation of cargo spaces shall comply with the requirements of 2.1.7.1.4;

.7 if provision is made for mechanical ventilation in cargo spaces, the fans shall comply with the requirements of 2.1.7.2;

.8 adequate natural ventilation shall be provided in cargo spaces to preclude the build-up of dust or gases and vapours from the cargo in the atmosphere. Wire mesh guards having a size of 13 mm x 13 mm shall be fitted over ventilation openings;

.9 ventilation openings of cargo spaces shall be arranged to prevent any passage of gases and vapours from cargo spaces into accommodation, service or machinery spaces located under and above the deck;

.10 ventilation openings leading to cargo spaces shall be fitted with wire guards of small mesh to prevent entry of sparks into the cargo spaces;

.11 at least four sets of protective clothing shall be provided on board, whose composition is to meet the requirements set out in emergency schedules for particular materials (refer to IMSBC Code);

.12 at least two self-contained breathing apparatuses shall be provided on board. For goods classified as dangerous goods, two self-contained breathing apparatuses shall be provided in addition to those in the fire-fighter's outfits;

.13 fire nozzles used for fire fighting on the weather deck and in cargo spaces shall be of a dual-purpose type (i.e., spray/jet type) incorporating a shutoff;

.14 bulkheads forming boundaries between machinery or service spaces and cargo spaces shall be gastight;

.15 bulkheads forming boundaries of cargo spaces shall be fire resisting and watertight;

Table 2.2.1

Bulk cargo			Requirements of 2.2.1																					
Class	Name of cargo ¹	UN No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
4.1	Sulphur (lump or coarse grained powder)	1350	—	+	—	+	—	—	+	+	+	+	—	+	—	+	+	+	—	+	—	+	—	+
4.2	Seed cake, oil cake, seed expellers	1386	+	+	—	+	+ ²	+ ²	+ ²	+	+ ²	+	—	+	—	+	+	+	+	+	+	+	—	+
	Copra, dry	2217	+	+	—	+	—	—	—	+	—	—	—	+	—	+	+	+	—	+	—	+	—	—
	Iron oxide, iron sponge	1363	+	+	—	+	—	—	+	+	+	—	+	+	+	+	+	+	+	+	—	+	—	+
	Ferrous metal	1376	+	+	—	+	—	—	+	+	+	—	+	+	+	+	+	+	+	+	—	+	—	+
4.3	Aluminium silicon	2793	+	+	—	+	—	—	—	+	—	—	—	+	—	+	+	+	—	+	+	+	—	—
	Aluminium ferrosilicon	1398	—	+	—	+	+	+	+	+	+	—	—	+	—	+	+	+	+	—	—	+	+	+
	Aluminium ferrosilicon	1395	—	+	—	+	+	+	+	+	+	—	—	+	—	+	+	+	+	—	—	+	+	+
	Aluminium processing by-products	3170	—	+	—	+	+	+	+	+	+	—	—	+	—	+	+	+	+	—	—	+	+	+
	Ferrosilicon	1408	—	+	—	+	+	+	+	+	+	—	—	+	—	+	+	+	+	—	—	+	+	+
	Zinc ashes, dross, residues, skimmings	1435	—	+	—	+	+	—	+	+	+	—	+	+	—	+	+	+	+	—	—	+	+	+
5.1	Aluminium nitrate and other nitrates ³	1438	—	—	+	—	—	—	—	+	—	—	+	+	+	—	+	—	—	—	—	—	—	—
	Ammonium nitrate fertilizers, type A	и др. 2067	—	—	+	+	—	—	+	+	—	—	+	+	—	+	+	+	—	—	—	+	—	+
	Ammonium nitrate	2070	—	—	+	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Lead nitrate	1942	—	—	+	+	—	—	+	+	—	—	+	+	—	+	+	+	—	—	—	+	—	+
	Barium nitrate	1469	—	—	+	—	—	—	—	+	+	—	+	+	+	+	+	—	—	—	—	+	—	—
7	Radioactive material, LSA-1, SCO-1	1446	—	+	+	—	—	—	—	+	+	—	+	+	—	+	+	—	—	+	—	—	+	—
9	Ammonium nitrate fertilizers, type B	2912	—	—	+	+	—	—	+	+	—	—	+	+	—	+	+	+	—	—	—	+	—	+
	Castor beans	2913	—	—	+	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Fishmeal and fisherap	2071	—	—	+	+	—	—	+	+	—	—	+	+	—	+	+	+	—	—	—	+	—	+
	Wood pellets	2969	+	+	—	—	—	—	—	+	+	—	+	+	+	+	+	—	—	+	—	—	—	—
	Sawdust	2216	+	+	—	+	—	—	—	+	—	—	—	—	+	—	+	—	—	+	+	—	—	—
	Charcoal		+	+	—	+	—	—	—	+	—	—	—	—	—	—	+	—	—	+	—	—	—	—
	Woodchips		—	+	—	—	—	—	—	+	—	—	—	—	—	—	+	—	—	+	—	—	—	—
	Direct reduced iron, DRI		+	+	—	+	—	—	—	+	+	—	—	—	—	+	+	—	+	+	—	+	+	+
	Direct reduced iron (briquettes hot moulded)		—	+	—	+	—	—	—	+	+	—	—	—	—	+	+	—	+	+	—	+	+	+
	Lime (unslaked)		—	+	—	—	—	—	—	+	+	—	—	—	—	—	+	—	—	—	—	—	—	—
	Metal sulphide concentrates		+	+	—	—	—	—	—	—	+	—	—	+	—	—	+	—	+	+	—	—	—	—
	Tankage		+	+	—	+	—	—	—	+	+	—	+	+	—	—	+	—	—	+	+	—	—	—
	Petroleum coke (calcined or uncalcined)		—	+	—	—	—	—	—	+	—	—	+	+	+	—	+	—	—	+	—	—	—	—
	Magnesia (unslaked)		—	+	—	—	—	—	—	+	+	—	—	—	—	—	+	—	—	—	—	—	—	—
	Calcined pyrites		—	+	—	—	—	—	—	+	+	—	—	—	—	—	+	—	—	—	—	—	—	—
	Pitch prill, prilled coal tar, pencil pitch		+	+	—	+	—	—	—	+	+	—	+	+	+	—	+	+	—	+	—	+	—	—
	Fluorspar		—	+	—	—	—	—	—	+	+	—	—	—	—	—	+	—	—	—	—	—	—	—
	Vanadium ore		—	+	—	—	—	—	—	+	+	—	—	+	—	—	+	—	—	+	—	—	—	—
	Silicomanganese		—	+	—	+	+	—	+	+	+	—	—	+	—	+	+	+	+	—	—	+	+	+
	Peat moss		—	+	—	+	—	—	—	+	+	—	—	—	—	—	+	—	—	+	—	—	—	—
	Coal		—	+	—	+	—	—	—	+	+	—	—	+	—	+	+	+	+	+	—	+	—	—
	Ferrosilicon		—	+	—	+	+	+	+	+	+	—	—	+	—	+	+	+	+	—	—	+	+	+
	Ferrophosphorus		—	+	—	+	+	—	+	+	+	—	—	+	—	+	+	+	+	—	—	+	+	+

¹ The proper shipping names of the materials are set out in Appendix 2.

² Used for seedcake containing solvent extractions.

³ "Other nitrates" shall comprise the following substances: calcium nitrate, UN 1454, magnesium nitrate, UN 1474, potassium nitrate, UN 1486, sodium nitrate, Chilean natural nitrate, UN 1498, sodium nitrate and potassium nitrate, mixture, Chilean natural potassic nitrate, UN 1499.

.16 bulkheads forming boundaries between cargo spaces and machinery spaces of category "A" shall be insulated to "A-60" class standard. Use of equivalent arrangements may be permitted subject to the Register approval;

.17 the ship shall be fitted with adequate equipment and devices to enable the measurement of concentration of gas emitted by cargo in cargo spaces without entering the spaces, together with a detailed operation manual (refer to IMSBC Code);

.18 the ship shall be fitted with adequate equipment and devices to measure oxygen concentration in cargo spaces together with a detailed operation manual;

.19 the ship shall be fitted with adequate equipment and devices for taking cargo temperature;

.20 the portable electrical equipment and tools used for entry and work in cargo spaces shall be explosion-proof. "NO SMOKING" signs shall be displayed at appropriate locations on board;

.21 the bilge system shall be designed to protect against pumping of water from cargo spaces through machinery space piping or pumps;

.22 the design of cargo space hatch covers shall comply with the requirements of 2.1.5.6.

2.2.2 A notice about the hazards likely to be encountered during entry into cargo spaces shall be displayed prominently in the vicinity of the accommodation spaces (refer to IMSBC Code).

2.2.3 Some of the requirements set out in 2.2.1 may be waived for certain bulk cargoes on agreement with the Register if relevant instructions are contained in the shipper's documents (such as Declaration of Bulk Cargo Transport Properties and Safe Sea Carriage Conditions) based on the goods' properties test results.

2.2.4 If continuous ventilation is required during the transport of the bulk cargo according to the shipper's documents, the arrangement of the ventilation openings of cargo spaces shall comply with the requirements of 3.2.8.3 of the Load Line Rules for Sea-Going Ships.

2.2.5 AMMONIUM NITRATE, UN No. 1942, shall not be loaded in cargo spaces adjacent to fuel oil tank(s), unless heating arrangements for the tank(s) are disconnected and remain disconnected during the entire voyage.

2.2.6 AMMONIUM NITRATE FERTILIZERS (UN Nos. 2067-2071) shall not to be stowed immediately adjacent to any tank, double bottom or pipe containing heated fuel oil unless there are means to monitor and control the temperature so that it does not exceed 50°C.

2.3 REQUIREMENTS FOR SHIPS CARRYING DANGEROUS GOODS OF CLASSES 6.2 AND 7

2.3.1 The possibility of approval of carriage on board of infectious substance of class 6.2 and of genetically modified microorganisms of class 9, UN 3245, shall be determined by the Register; moreover, the Head Office shall be provided with an instruction on the carriage of such substances agreed with competent authorities.

All infectious substances of class 6.2 shall be separated by a compartment or hold from the accommodation spaces.

2.3.2 Requirements for ships carrying dangerous goods of class 7.

2.3.2.1 Ships carrying dangerous goods of class 7 in packaged form in cargo spaces shall comply with the requirements of 2.1.3, 2.1.4.1, 2.1.4.2, 2.1.6, 2.1.9.2 and 2.1.11.

2.3.2.2 Ships carrying dangerous goods of class 7 in packaged form on the weather deck shall comply with the requirements of 2.1.4.1, 2.1.4.2, 2.1.9.2 and 2.1.11.

2.3.2.3 Based on the properties of a specific dangerous good of class 7, the ship shall be provided with additional outfit as follows:

.1 personal skin and respiratory protective aids resistant to chemical attack by the materials carried, one full set for each member of the ship's emergency group;

.2 portable devices for radiation and exposure monitoring;

.3 medicines and decontamination agents.

The amount and type of the additional outfit shall be in accordance with the material's emergency schedules.

2.3.2.4 Securing of containers and packages containing dangerous goods of class 7 is to comply with the requirements of the Guidelines on Drawing Up Cargo Securing Manuals.

2.3.2.5 Ships carrying dangerous goods of class 7 shall have a radiation protection program agreed with competent authorities.

2.3.2.6 Ships carrying goods of class 7 having a subsidiary risk (for instance, uranium hexafluoride has a subsidiary risk of class 8) shall also comply with the requirements applicable to ships carrying those classes of materials as appropriate to the subsidiary risks.

2.3.2.7 Ships carrying dangerous goods of class 7 can also be subject to requirements additional to those indicated above as contained in shipper's documents.

2.3.2.8 Ships carrying packaged irradiated nuclear fuel, plutonium and high-level radioactive wastes in accordance with schedules 10, 11, 12, 13 or 14 of the IMDG Code shall comply with the applicable requirements of the Code and of Chapter 7.3, Part VI "Fire Protection" of the Rules for the Classification and Construction of Sea-Going Ships.

The ship's conformity for the carriage of such goods shall be determined by the Register in each particular case.

3 SURVEYS OF SHIPS CARRYING DANGEROUS GOODS AND ISSUANCE OF DOCUMENTS

3.1 SURVEYS OF SHIPS CARRYING DANGEROUS GOODS

3.1.1 Surveys for the issuance, renewal, or endorsement of certificates of ship's fitness for the carriage of dangerous goods consist in verifying compliance with special requirements of Chapter II-2 of the 1974 SOLAS Convention as amended, applicable requirements of the IMDG Code and IMSBC Code, wherein trials and operation tests of systems, equipment and outfit are carried out as necessary.

Where Russian ships are concerned, compliance with the applicable requirements of MOPOG Rules and NG Rules is also verified.

3.1.2 The requirements to surveys and issuance of documents in accordance with the SOLAS Convention, IMDG Code and IMSBC Code are specified in 2.1.5 and 2.1.12 of Part III, "Survey of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for the Equipment of Sea-Going Ships" of the Guidelines.

3.1.3 Ships carrying packaged irradiated nuclear fuel, plutonium and high-level radioactive wastes can be issued with an International Certificate of Fitness for the Carriage of INF Cargo in Form 2.1.5 subject to the fulfillment of the requirements of 2.3.2.8.

Report on Survey of the Ship (Form 6.3.10) is to be drawn up for the issuance of a Certificate in Form 2.1.5.

3.1.4 Where names of specific dangerous goods that are permitted or not permitted for carriage on board are mentioned in documents, proper shipping names shall be used as per Chapter 3.2 of IMDG Code. Trade names of the goods shall normally not be used; such names can be used in documents as a supplement to the proper shipping name. Proper shipping names of materials possessing chemical hazards are set out in Appendix 2.

LIST OF SOLID BULK CARGOES WHICH ARE NON-COMBUSTIBLE, OR CONSTITUTE A LOW FIRE RISK, OR FOR WHICH A FIXED GAS FIRE-EXTINGUISHING SYSTEM IS NOT EFFECTIVE

Table 1

List of solid bulk cargoes for which a fixed gas fire-extinguishing system may be exempted

Cargo name
<p>1 Ore Coal (COAL and BROWN COAL BRIQUETTES) Grain Unseasoned timber 2 Cargoes listed in IMSBC Code , which are not combustible or constitute a low fire risk, as follows: .1 all cargoes not categorized into Group B in IMSB C Code; .2 the following cargoes categorized into Group B in IMSBC Code: ALUMINA HYDRATE ALUMINIUM SMELTING BY-PRODUCTS, UN 3170 (Both the names ALUMINIUM SMELTING BY-PRODUCTS or ALUMINIUM REMELTING BY-PRODUCTS are in use as proper shipping name) ALUMINIUM FERROSILICON POWDER, UN 1395 ALUMINIUM SILICON POWDER, UNCOATED, UN 1398 AMORPHOUS SODIUM SILICATE LUMPS BORIC ACID CALCINED PYRITES (Pyritic ash) CLINKER ASH COAL TAR PITCH DIRECT REDUCED IRON (A) Briquettes, hot moulded FERROPHOSPHORUS (including briquettes) FERROSILICON, with more than 30% but less than 90% silicon, UN 1408 FERROSILICON, with 25% to 30% silicon, or 90% or more silicon FLUORSPAR (calcium fluoride) GRANULATED NICKEL MATTE (LESS THAN 2% MOISTURE CONTENT) LIME (UNSLAKED) LOGS MAGNESIA (UNSLAKED) PEAT MOSS PETROLEUM COKE1 PITCH PRILL PULP WOOD RADIOACTIVE MATERIAL, LOW SPECIFIC ACTIVITY MATERIAL (LSA-1), UN 2912 (non-fissile or fissile – excepted) RADIOACTIVE MATERIAL, SURFACE CONTAMINATED OBJECT(S) (SCO-I or SCO-II), UN 2913 (non-fissile or fissile – excepted) ROUNDWOOD SAW LOGS SILICOMANGANESE SULPHUR, UN 1350 TIMBER VANADIUM ORE WOODCHIPS, with moisture content of 15% or more WOOD PELLETS (NOT CONTAINING ANY ADDITIVES AND/OR BINDERS) ZINC ASHES, UN 1435 .3 Cargoes assigned to the following generic Group B shipping schedules when they do not exhibit any self-heating, flammability, or water-reactive flammability hazards in accordance with the MHB tests and classification criteria contained in the Code: METAL SULPHIDE CONCENTRATES 3 Solid bulk cargoes which are not listed in the IMSBC Code, provided that: .1 they are assessed in accordance with section 1.3 of the Code; .2 they do not present hazards of Group B as defined in the Code; and .3 a certificate has been provided by the competent authority of the port of loading to the master in accordance with 1.3.2 of the Code.</p>
When loaded and transported under the provisions of IMSBC Code.

Table 2

**List of solid bulk cargoes for which a fixed gas fire-extinguishing system is ineffective
and for which a fire-extinguishing system giving equivalent protection shall be available**

Cargo name
The following cargoes categorized into Group B of IMSBC Code: ALUMINIUM NITRATE, UN 1438 AMMONIUM NITRATE, UN 1942 (with not more than 0.2% total combustible material, including any organic substance, calculated as carbon to the exclusion of any other added substance) AMMONIUM NITRATE BASED FERTILIZER, UN 2067 AMMONIUM NITRATE BASED FERTILIZER, UN 2071 BARIUM NITRATE, UN 1446 CALCIUM NITRATE, UN 1454 LEAD NITRATE, UN 1469 MAGNESIUM NITRATE, UN 1474 POTASSIUM NITRATE, UN 1486 SODIUM NITRATE, UN 1498 SODIUM NITRATE AND POTASSIUM NITRATE, MIXTURE, UN 1499

**LIST OF BULK MATERIALS POSSESSING CHEMICAL HAZARDS
CATEGORIZED INTO GROUP B OR CLASSIFIED AS MHB**

Proper shipping name	Class (subsidiary)	UN No.
Alumina Hydrate	BOH	—
Aluminium smelting/remelting by-products, processed	BOH	—
Aluminium processing by-products	4.3	3170
Aluminium ferrosilicon powder	4.3	1395
Aluminium nitrate	5.1	1438
Aluminium silicon powder, uncoated	4.3	1398
Ammonium nitrate	5.1	1942
Ammonium nitrate fertilizers type A	5.1	2067 — 2070
Ammonium nitrate fertilizers type B	9	2071
Amorphous sodium silicate lumps	BOH	—
Barium nitrate	5.1 (6.1)	1446
BROWN COAL BRIQUETTES	BOH	—
Calcined pyrites (Pyritic ash, Fly ash)	BOH	—
Calcium nitrate	5.1	1454
Castor beans	9	2969
Charcoal	BOH	—
Clinker ash, wet	BOH	—
Coal	BOH	—
Coal tar pitch	BOH	—
Copra	4.2	1363
Direct reduced iron	BOH	—
Ferrophosphorus (including briquettes)	BOH	—
Ferrosilicon, with 30 % or more but less than 90 % silicon	4.3 (6.1)	1408
Ferrosilicon, with 25 to 30 % silicon or with 90 % or more silicon (including briquettes)	BOH	—
Ferrous metal borings, shavings, turnings, or cuttings, in form liable to self-heating.	4.2	2793
Iron swarf. Steel swarf	9	2216
Fishmeal, stabilized. Fish scrap, stabilized. Anti-oxidant treated. Moisture content greater than 5 % but not exceeding 12 %, by mass. Fat content not more than 15 % by mass	9	2216
Fluorspar (calcium fluoride)	BOH	—
Granulated nickel matte (less than 2% moisture content)	BOH	—
Iron oxide, spent. Iron sponge, spent	4.2	1376
Lead nitrate	5.1 (6.1)	1469
Lime (unslaked) (Calcium oxide, quicklime, dolomitic quicklime)	BOH	—
LINTED COTTON SEED	BOH	—
Magnesia (unslaked) (Lightburned magnesia, calcined magnesite, caustic calcined magnesite)	BOH	—
Magnesium nitrate	5.1	1474
Metal sulphide concentrates	BOH	—
Peat moss	BOH	—
Petroleum coke, calcined or uncalcined	BOH	—
Pitch prill, prilled coal tar, pencil pitch	BOH	—
Potassium nitrate (Saltpetre)	5.1	1486
Radioactive material, low specific activity (LSA-I), N.O.S.	7	2912
Radioactive material, surface contaminated objects (SCO-I)	7	2913
Sawdust	BOH	—
Seed cake, containing vegetable oil, mechanically expelled seeds, containing more than 10 % of oil or more than 20 % of oil and moisture combined. (Meal, oily. Oil cake. Seed expellers, oily)	4.2	1386
Seed cake, containing vegetable oil, solvent extractions and expelled seeds, containing not more than 10 % of oil and, when the amount of moisture is higher than 10%, not more than 20 % of oil and moisture combined (meal, oily, oil cake, seed expellers, oily)	4.2	1386
Seed cake, containing vegetable oil, solvent extractions containing not more than 1,5 % of oil and 11 % of moisture (meal, oily, oil cake, seed expellers, oily)	4.2	2217
Silicomanganese	BOH	—
Sodium nitrate (Chile saltpetre. Chilean natural nitrate)	5.1	1498
Sodium nitrate and potassium nitrate, mixture (Chilean natural potassic nitrat)	5.1	1499
SOLIDIFIED FUELS RECYCLED FROM PAPER AND PLASTICS	BOH	—
Sulphur, lump and coarse grained powder	4.1	1350
Tankage	BOH	—
Vanadium ore	BOH	—
Woodchips	BOH	—
Wood pellets	BOH	—
Wood products – General:	BOH	—
LOGS	BOH	—
PULP WOOD	BOH	—
TIMBER	BOH	—
ROUNDWOOD	BOH	—
SAW LOGS	BOH	—
WOOD TORREFIED	BOH	—
Zinc ashes, zinc dross, zinc residue, zinc skimmings	4.3	1435

HAZARDOUS AREAS AND ELECTRICAL EQUIPMENT THAT MAY BE USED IN THESE AREAS

1 HAZARDOUS AREAS

1.1 For dangerous bulk cargoes of class 1, except for division 1.4S, the hazardous areas are as follows:

.1 closed cargo spaces and closed or open ro-ro cargo spaces (see paragraph 1, Table 1);

.2 permanently fixed magazines (see paragraph 1, Table 1).

1.2 For dangerous bulk cargoes of classes 4.1, 4.2, 4.3, 9 and MHB, the hazardous areas are as follows:

.1 closed cargo spaces, as indicated in paragraph 1, Table 1;

.2 any ventilation ducts serving the spaces identified in 1.2 (see paragraph 2, Table 1);

.3 enclosed or semi-enclosed spaces having a direct opening into any of the areas as identified in 1.2.1 or 1.2.2 unless appropriate measures are taken to prevent flammable vapours or dust entering such spaces (see paragraph 3, Table 1);

.4 enclosed or semi-enclosed spaces having a direct opening into any of the areas as identified in 1.2.1 or 1.2.2, which are provided with closing arrangements (see paragraph 4 or 6, Table 1);

.5 areas on open deck, or semi-enclosed spaces on open deck, within 3 m of any exhaust ventilation outlet of a hazardous area (see paragraph 7, Table 1);

1.3 For dangerous goods of classes 2.1, 3.1, 3.2, 6.1 (liquids having a flashpoint of ≤ 23 °C) and 8 (liquids having a flashpoint of ≤ 23 °C), hazardous areas are as follows:

.1 closed cargo spaces and closed or open ro-ro cargo spaces (see paragraph 1, Table 1);

.2 any ventilation ducts serving the spaces identified in 1.3 (see paragraph 2, Table 1);

.3 enclosed or semi-enclosed spaces having a direct opening into any of the areas as identified in 1.3.1 or 1.3.2 unless appropriate measures are taken to prevent flammable vapours or dust entering such spaces (see paragraph 3, Table 1);

.4 enclosed or semi-enclosed spaces having a direct opening into any of the areas as identified in 1.3.1 or 1.3.2, which are provided with closing arrangements (see paragraph 4 or 6, Table 1);

.5 areas on open deck, or semi-enclosed spaces on open deck, within 3 m of any exhaust ventilation outlet of a hazardous area (see paragraph 7, Table 1).

2 ELECTRICAL EQUIPMENT IN HAZARDOUS AREAS

2.1 Electrical equipment and wiring shall not be fitted in hazardous areas unless it is essential for the safety and operation of the ship. The electrical equipment installed and employed shall have:

.1 explosion protection corresponding to the category and group of the most dangerous gas mixture;

.2 adequate degree of protection and surface temperature for explosive dust;

Cables shall comply with the requirements of Section 3.

2.2 Where there is risk due to explosive dust only from solid bulk cargoes, the electrical equipment shall comply with the following minimum requirements, unless otherwise specified (see 2.4 and Table 2):

degree of protection IP55 and surface temperature maximum 200 °C, or

safe type equipment of temperature class not lower than T3 having a degree of protection IP55.

Cables shall comply with the requirements of Section 3.

2.3 Where there is risk due to explosive gas atmosphere only, the electrical equipment shall comply with the following minimum requirements, unless otherwise specified (see 2.4 and Table 2):

temperature class T3;

apparatus group IIB.

Safe type equipment having the following types of explosion protection may be used:

Table 1

Hazardous areas

Symbols:



— gas-tight self-closing door;



— non-hazardous space;



— hazardous areas;



— extended hazardous area

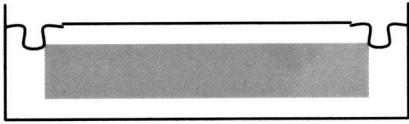
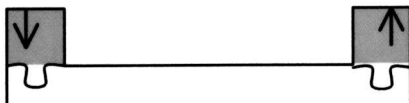
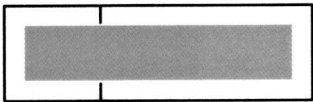
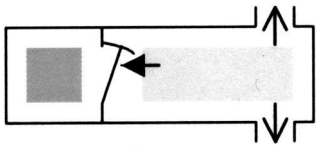
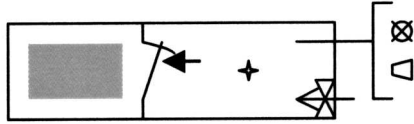
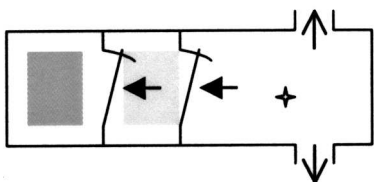
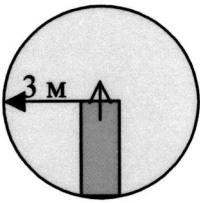
Item	Subparagraph	Typical examples	Remarks
1	1.1.1, 1.1.2, 1.2.1, 1.3.1		—
2	1.2.2, 1.3.2		—
3	1.2.3, 1.3.3		—
4	1.2.4, 1.3.4		Natural ventilation
5			Pressurized space; visual and audible alarm at a manned position in case of loss of pressure
6	1.2.4, 1.3.4 (only for enclosures)		Natural ventilation
7	1.2.5, 1.3.5		—

Table 2

Requirements for electrical equipment on the basis of specific bulk cargoes

Dangerous goods	IMO class	Dominant risk ¹	Degrees of protection against explosive dust atmosphere	Protection against explosive gas atmosphere	
				Apparatus group	Temperature class
Aluminium dross	4.3	Hydrogen	—	IIC	T2
Aluminium ferrosilicon powder	4.3	Ditto	—	IIC	T2
Aluminium silicon powder uncoated	4.3	— « —	—	IIC	T2
Ammonium nitrate fertilizers:					
type A	5.1	See note ²	—	—	—
type B	9	See note ²	—	—	—
Coal	MHB	Dust, methane	IP55	IIA	T4
Direct reduced iron	MHB	Hydrogen	—	IIC	T2
Ferrophosphorus (no briquettes)	MHB	Ditto	—	IIC	T1
Ferrosilicon	4.3	— « —	—	IIC	T1
Iron oxide, iron sponge	4.2	Dust	IP55	IIA	T2
Seed cake, expellers	4.2	Hexane	—	IIA	T3
Silicomanganese	MHB	Hydrogen	—	IIC	T1
Sulphur	4.1	Inherent	IP55	—	T4
Zinc ashes, dross, residues, skimmings	4.3	Hydrogen	—	IIC	T2

¹ This column relates only to the possible evolution of substances which will affect the installation of electrical equipment and cables.

² Provision shall be made to disconnect all electrical circuits terminating within cargo spaces, in accordance with 3.1.

intrinsically safe Ex_{ia} or Ex_{ib} ;

flame-proof Ex_d ;

pressurized enclosure Ex_p ;

increased safety Ex_e ;

encapsulation Ex_m .

Cables shall comply with the requirements of Section 3.

2.4 Where the properties of the cargoes intended for transport are unknown, or where a ship is intended for the carriage of any dangerous goods, the type of electrical equipment shall comply with the following requirements:

degree of protection – IP65;

temperature class – T6;

apparatus group – IIC.

Cables shall comply with the requirements of Section 3.

2.5 Where solid bulk cargoes and MHB only are to be carried, the type of electrical equipment shall comply with the requirements of 2.2 and 2.3 and minimum requirements of Table 2.

2.6 Where there is risk due to explosive gas atmosphere and dust, the electrical equipment shall be of suitable type for safe use in the flammable atmosphere and flammable dust concerned (see 2.2 and 2.3).

2.7 For dangerous goods of class 1, except for division 1.4S, the electrical equipment shall comply with the following requirements:

degree of protection – IP65;

surface temperature – maximum 100 °C;

Cables shall comply with the requirements of Section 3.

2.8 The electrical equipment in hazardous areas identified in 1.2.4 and 1.3.4, according to paragraphs 4 and 6 of Table 1, shall be:

.1 appropriate for use in adjacent spaces in accordance with 2.2 to 2.7; or

.2 of type of protection "n" and of appropriate temperature class, apparatus group and degree of protection in accordance with 2.2 to 2.7; or

.3 of a type, which ensures absence of sparks or arcs or hot spots during normal operation, and which is approved by a competent authority.

Cables shall comply with the requirements of Section 3.

2.9 The electrical equipment in enclosures mentioned in paragraph 6 of Table 1 shall comply with the requirements of 2.8.

3 INSTALLATION OF ELECTRICAL EQUIPMENT IN HAZARDOUS AREAS

3.1 In areas which are classified as hazardous, electrical equipment, which is not essential for the safety and operation of the ship and which is not of a type approved for use in the hazardous areas specified in Section 1, shall be completely disconnected and protected against unauthorized re-connection. Disconnection shall be made outside the hazardous areas and be effected with isolating links or lockable switches.

3.2 All cables and electrical equipment shall be protected against mechanical damage.

3.3 Cable penetrations of decks and bulkheads shall be sealed against the passage of gas or vapour.

3.4 Cable joints shall be avoided where possible. When joints are unavoidable, they shall be enclosed in metal-clad or impact strength plastic junction boxes of certified-safety type as specified in Section 2 or in heat-shrink or encapsulated-crimp sleeve cable joints.

3.5 Cables shall be:

- .1** enclosed in steel heavy gauge, solid-drawn or continuously butt-welded and galvanized conduit; or
- .2** protected by electrically continuous metal sheathing or metallic wire armour, braid or tape; or
- .3** of the mineral-insulated metal-covered type.

4 PORTABLE ELECTRICAL EQUIPMENT

4.1 Portable electrical equipment shall normally have its own self-contained source of power (except for intrinsically safe circuits) and be certified-safe type as specified in Section 2.

26. INSTRUCTIONS FOR SURVEY OF SHIP'S PIPING

1 APPLICATION

1.1 The requirements of this Instruction apply to metal and alloy piping of ship's service systems and machinery installation systems, including bottom and side inlet and outlet branch pipes, being subject to the Register technical supervision.

1.2 The Register uses the Instruction requirements to the extent that is appropriate in carrying out the technical supervision of ship's piping in service, and also in repairs and conversion of ships.

1.3 The Instruction specifies the parameters, permissible standards and means of control over a technical condition of piping in carrying out classification surveys.

The scope of periodical surveys is determined by the Register Surveyor in each case on the basis of Table 2.1.1 of the Rules with due regard for specific conditions, the piping defects identified, and the ship's type and age.

1.4 The Instruction provisions provide a basis for the procedure, intended for the Register Surveyors, for control over a technical condition of ship's piping in service.

2 GENERAL

2.1 A technical condition of piping which defines the fitness of its components for further use according to their purpose within a certain time period, is qualified as complying with the RS rules or not complying with the RS rules.

"Complying with the RS rules" means that a pipeline may be used according to its purpose until the date of the next special survey.

"Not complying with the RS rules" means that the defects identified prevent the use of pipelines according to their purpose, i.e. they are to be repaired or replaced. In specific cases, the terms of repair completion may be established according to Annex 17.

2.2 A technical condition of piping during surveying is assessed by comparing the measurements of controllable parameters and identified defects with the limiting standards.

At surveys, the Shipowner shall provide information on all in-service defects and damages, repairs and replacements of piping components within a period between surveys, as well as the results of measuring residual thicknesses, of examinations and operation tests of pipelines during systems operation.

2.3 The residual thicknesses of piping components are to be measured in the process of preparations for a special survey. The extent of measurements may be agreed by the Shipowner with the RS Branch Office in a good time, e.g. at the fourth annual survey.

2.4 The measurements of residual thicknesses of piping components are to be carried out by companies holding a relevant Recognition Certificate issued by the Register.

3 IN-SERVICE DEFECTS OF PIPING

3.1 In-service defects of piping appear as corrosion-erosion wear, mechanical damages, technological defects and in-service deposits.

3.2 The corrosion-erosion wear is the dominant type of damages to the inside and outside of a pipeline being defined by a corrosion area and depth of penetration into metal:

total wear (thinning) means the even reduction of a pipeline wall thickness at a relatively small rate of penetration;

local wear (pitting) is a damage to certain limited areas of pipe surfaces in the form of cavities (pits), of which a diameter is approximately equal to the depth, at a penetration rate noticeably exceeding a rate of total corrosion;

blow hole is a local through destruction of pipe walls of which a diameter is less than a pipe wall thickness.

The local wear is generally limited to pipeline parts (tee-pipes, branches, zones at valves, machinery, apparatuses) and pipe joints.

The total wear is mostly associated with straight sections of pipelines.

3.3 Mechanical damages are ruptures, cracks, indents:

rupture is a break of pipe wall integrity due to the short-term exposure to a hydraulic shock, to working medium overpressure, freezing, a technological defect;

crack is a break of pipe wall integrity on boundaries of metal grains due to deformations or fatigue effects;

indent is a recess on a pipe surface due to the short-term dynamic exposure (impact) or concentrated static load on the pipe outside.

3.4 Technological defects are:

leakage of pipe joints means leaks or air inflow;

defects of piping anchoring means the lack of suspensions, pipe straps, gaskets or the slack of their securing;

lack of protectors in specified locations;

break of insulation.

3.5 In-service deposits mean corrosion buildup, salt sediments, dirt, microbiological fouling.

4 TECHNICAL CONDITION PARAMETERS AND STANDARDS FOR PIPING

4.1 The main controllable parameter directly defining a technical condition of piping is the residual thickness of a pipe wall S_{oct} in mm, at the time of surveying:

S_{oct}^0 = arithmetical mean residual thickness for straight sections of pipes at total wear, in mm;

S_{oct}^M = minimum residual thickness for "critical" sections of pipes at local wear, in mm.

4.2 At forecasting of ship's pipelines residual lifetime, a normative parameter defining the compliance of a pipeline and its components for the further use according to their purpose within the time period until the next survey is the minimum permissible residual thickness of pipe walls S_{don} in mm, determined for total and local wear by the formula

$$S_{don} = [S] + KS_0 + V_\phi T_{ocb}$$

where $[S] = P_{BH}d_H/(2\sigma + P_{BH})$ is the design thickness of a pipe wall, in mm, which corresponds, by strength conditions, to a limiting state of pipeline components regardless of their category (straight sections, branches, tee-pipes, branch pipes, zones at valves, machinery, apparatuses). The thickness $[S]$ is calculated depending on an internal working pressure P_{BH} , in MPa, in pipeline, the outer diameter d_H , in mm, of a pipe and the permissible tensile stress σ , in MPa, of pipe material:

108 for steel 10;

147 for steel 20;

46 for copper M3P;

58 for copper-nickel alloy MHЖ5-1;

80 for copper-nickel alloy MHAЖMЦ6-1.5-1-1;

KS_0 = allowance, in mm, to compensate errors of measuring a residual thickness of pipe due to an irregular depth of corrosion on the pipe surface, as well as pipeline components design and workmanship (thinning of a pipe wall in the condition of supply); the above errors are to be taken into account with a factor K of which the values, in determining S_{don} , are assumed equal to:

$K = 0,15$ at total wear (for straight sections of pipes);

$K = 0,25$ at local wear (for "critical" sections of pipes);

for air pipes and ventilator pipes covered by IACS Unified Requirements S27 internal pressure $P_{BH} = 0$ and coefficient $K = 0,25$;

S_0 = as-built (initial) thickness of pipe, assumed according to a specification or the basic diagram of a system at a pipe wall thickness after replacement, in mm;

$V_\phi T_{ocb}$ = allowance for corrosion, in mm, to compensate the loss of metall due to an actual rate of corrosion V_ϕ , in mm per year, for a time period until the next survey T_{ocb} , in years.

Once calculated, the values of $[S]$ and KS_0 remain unchanged during the entire lifetime for single components of pipeline.

The values of $V_\phi T_{ocb}$ are determined at each special survey.

4.3 An actual rate of corrosion V_ϕ is a parameter that takes into account the real effect of the velocity of the medium being transferred, the intensity and conditions of pipeline operation on its components wear in service. The actual rate of corrosion for a period between surveys is to be determined by the formulae:

$$V_\phi^O = (S_{oct}^{O1} - S_{oct}^O) / T_\phi;$$

$$V_\phi^M = (S_{oct}^{M1} - S_{oct}^M) / T_\phi$$

where S_{oct}^{O1} , S_{oct}^{M1} = residual thicknesses at total and local wear recorded at a previous survey, respectively, in mm;
 T_ϕ = time period between surveys or since the last replacement, in years.

Note: Where residual thickness measurements at previous surveys are lacking, actual rates of corrosion may be determined by the formulae:

$$V_\phi^O = (S_O - S_{oct}^O) / T_\phi;$$

$$V_\phi^M = (S_O - S_{oct}^M) / T_\phi$$

where T_ϕ = actual time period of a pipeline component in service since the time of construction (if was not replaced) or since the last replacement, years.

4.4 At application of a forecasting method of ship's pipelines residual lifetime, a criterion for the compliance of a pipeline for the time period until the next planned survey (special or intermediate) is a design residual lifetime of pipeline components T_{oct} , in years. In forecasting T_{oct} , a linear dependence of corrosion-erosion wear from the actual operation life of a pipeline is applied.

The residual lifetime of a pipeline is to be calculated for total and local wear by the formulae:

$$T_{oct}^O = (S_{oct}^O - [S] - KS_0) / V_\phi^O = [(S_{oct}^O - [S] - KS_0) / (S_{oct}^{O1} - S_{oct}^O)] T_\phi ;$$

$$T_{oct}^M = (S_{oct}^M - [S] - KS_0) / V_\phi^M = [(S_{oct}^M - [S] - KS_0) / (S_{oct}^{M1} - S_{oct}^M)] T_\phi,$$

Where residual thickness measurements at previous surveys are lacking, Note in 4.3 is to be taken into account.

A pipeline shall be recognized as complying with the RS requirements according to its purpose until the next special survey if the measurements of S_{oct}^O and S_{oct}^M for pipeline components exceed the corresponding values of $S_{доп}^O$ and $S_{доп}^M$ calculated; in this case the design residual life time is under 5 years, but over 2 or 3 years, the pipeline repair shall be assigned during the next intermediate survey or special survey, whichever is the earlier.

4.5 Technical condition of the Kingston pipeline filters shall be determined as for a pipeline component in compliance with 4.2 to 4.4. Herewith, internal pressure $P_{BH} = 0,1$ MPa and coefficient $K = 0,25$. Filter body outside diameter shall be taken as nominal diameter d_H .

4.6 The maximum permissible values of controllable parameters, mechanical, technological and operational damages and defects are given in Table 4.6.

4.7 Forecasting the residual life of a pipeline (the Kingstone pipeline and its filters included) in compliance with 4.2 – 4.5 may not be carried out if their residual thickness (refer to 4.1) is not less than:
 $0,5S_0$ - with total wear but at least 2 mm;

Table 4.6

Maximum permissible values of controllable parameters, defects and damages at ship's piping at surveys

Type of defect (damage)	Method of determining	Maximum permissible value by condition categories	
		complying with the RS requirements	not complying with the RS requirements
1. Total wear	Examination, residual thickness measurements	$S_{oct}^O > S_{дон}^O$	$S_{oct}^O \leq S_{дон}^O$
2. Local wear: pits, spots	Examination, inspection for defects, residual thickness measurements	$S_{oct}^M > S_{дон}^M$	$S_{oct}^M \leq S_{дон}^M$
blowholes	Examination, operation test of a system	None	Yes
3. Damages: ruptures, cracks	Examination, operation test of a system	No break of tightness	No break of tightness
indent, bulges	Examination, measurements of defect depth (height)	$\leq 0,1d_H$	$> 0,1d_H$
nicks, external corrosion and other defects of outer surface	Examination, measurements of defect depth	$\leq 0,25S_0$	$> 0,25S_0$
4. Deposits	Operation test of a system	Parameters of system functioning are normal (flow rate, liquid pressure)	Inadmissible deviation of parameters of system functioning (reduced flow rate, increased discharge pressure of liquid)
5. Weld wastage	Examination, measurements of defect depth	$< 20\%$	$> 20\%$ (wastage of pipe-flange butt welds below the surface of the pipe is not allowed)

$0,3S_b$ - with local wear and pitting but at least 1 mm, where S_0 is as-built thickness of a pipe".

If according to the results of the technical condition assessment, the residual thickness of pipe walls and the Kingstone pipeline and its filters are within the allowable limits established by RS, their technical condition is assessed as complying with the RS requirements.

5 ASSESSMENT OF TECHNICAL CONDITION

5.1 The assessment of a technical condition of piping is carried out by visual examination and tapping with a special hammer of an outer surface, measuring external damages and residual pipe wall thicknesses, testing a system in operation, if needed, and by leak tests.

5.2 At visual examination, all mechanical damages and technological defects (see 3.3 and 3.4) are to be identified.

Corrosive wear and mechanical damages on the external surface of a pipe and welds are to be evaluated by comparing their dimensions with the permissible ones (see Table 4.5). The value of the defects detected is determined with sizing tools (rulers, indicators, slide gage, caliper, depth gage, feeler, snap gage).

The condition and tightness of flanges anchoring air and sounding pipes to the inner bottom plating are to be checked.

The presence (renovation) of corrosion protection used on ship at construction is to be checked.

5.3 A need and an extent of control of a residual thickness of pipeline component walls are to be evaluated on the basis of the visual examination results.

An ultrasonic thickness gage allowing residual thickness measurements in zones of total and local wear is to be recommended for use. Just as fault indicators for the accelerated search of intensive pitting zones, so other methods and means, which are approved for use by the Register, may be used during control.

5.4 Locations and zones for pipeline components control are to be specified in accordance with the recommendations in Appendices 1 and 2.

The residual thicknesses of a pipe wall within its straight section as to total wear (refer to Appendix 1) shall be measured at three sections which are equidistant along the pipe outside a zone of "critical" sections. The measurements are to be carried out at four equidistant points over a diameter in each section.

The value of $S_{\text{oct}}^{\text{O}}$ is to be determined as an arithmetical mean of values obtained from measurements. Measurements of $S_{\text{oct}}^{\text{M}}$ for pipeline sections as to local wear (refer to Appendix 2) are to be carried out in lines of control:

branches – along a pipe axis (in a generatrix);

tee-pipes, at valves, machinery and pipe joints – in transverse cross sections of a pipe.

In control of welded tee-pipes, measurements shall be taken in a control line along the weld down the flow.

Measurements are to be made by moving a transducer in the control line, or at points in the control line, but at three points as a minimum. Where wastage exceeds 30 per cent of S_0 , measurements shall be made at six points as a minimum.

For ships built before 01.01.1999 the permissible residual thickness of inlet and outlet branch pipes shall be not less than $0,5 S_0$ for general and groove wear; $0,3 S_0$ for pitting, where S_0 — as-built branch pipe thickness, mm (but not less than the minimum thickness of the shell plating at ship's extremities determined according to the applicable Rules for Construction; however, it does not need to exceed 12 mm). For ships built on 1 January 1999 and after that date, the permissible residual thickness of inlet and outlet branch pipes shall be not less than $0,5 S_0$ or 6 mm, whatever is greater, for general and groove wear, $0,3 S_0$ or 4 mm, whatever is greater, for pitting, where S_0 — as-built branch pipe thickness (but not less than thickness determined in accordance with the requirements of the applicable Rules for Construction: for ships built before 1 January 2018 or after this date (refer to 4.3.2.10, Part VIII "Systems and Piping").

Welded-on branch pipes of bottom and side valves are to be subject to surveying with residual thickness measurements at six diametrically opposite points after dismounting the bottom and side valves: immediately at the flange, at a distance of a diameter from the latter and at the maximum distance from the flange. The survey is to be held at each dry-docking starting with the second special survey of a ship.

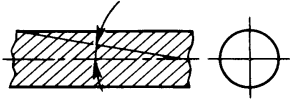
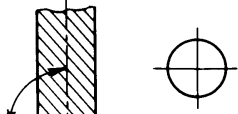
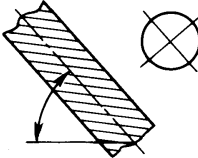
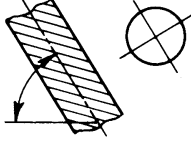
5.5 The technical condition shall be assessed to determine compliance with the RS rules (refer to 4.7) according to the results of measurements made.

5.6 The results of evaluating of the technical condition of the pipeline shall be drawn up as a Table in compliance with the requirements of Appendix 4 to the Rules, and attached to the Thickness Measurement Report.

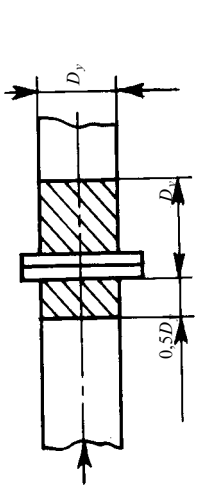
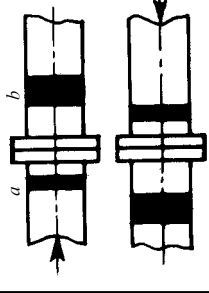
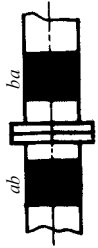
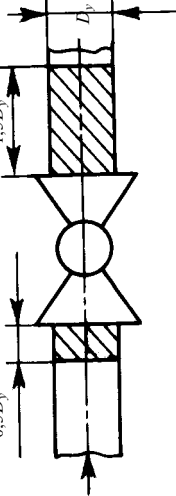
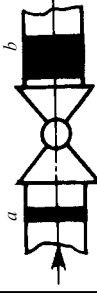

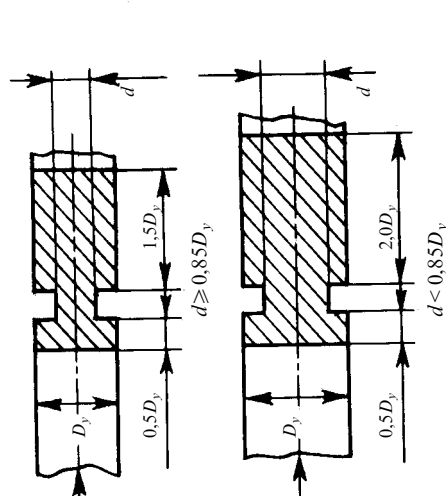
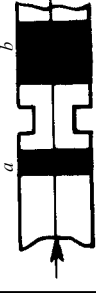

5.7 During a pre-repair inspection of piping for defects, residual thicknesses of all components are to be measured with a compulsory evaluation of total wear.

5.8 A need for repairs of valves is ascertained using records in a log book, the results of system operation tests and hydraulic tests, and the results of an inspection for defects. The tightness tests of piping are generally to be carried out in combination with machinery, apparatuses, valves and other equipment of the system considering the requirements of Section 20, Part VIII "Systems and Piping" of the Rules for the Classification and Construction of Sea-Going Ships.

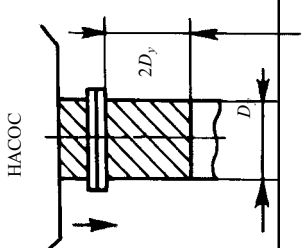
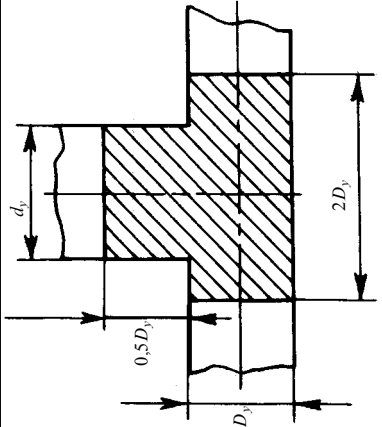
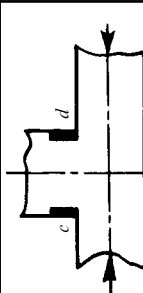
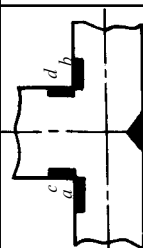
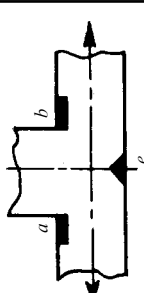
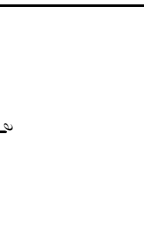
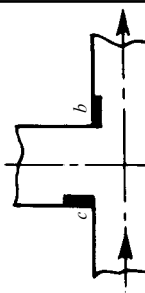

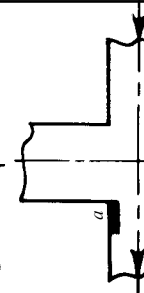

Pipeline control by total wear of straight (axial-symmetric) sections

Nos.	Type of pipeline (pipe section)	Record of control points	Note
I	Horizontal  $0^\circ \leq \alpha \leq 10^\circ$	I — a; I — b; I — c; I — d	
II	Vertical  $80^\circ \leq \alpha \leq 90^\circ$	II — a	
III	Inclined  $10^\circ < \alpha \leq 45^\circ$	III — a; III — b; III — c; III — d	
IV	Inclined  $45^\circ < \alpha \leq 80^\circ$	IV — a; IV — b; IV — c; IV — d	

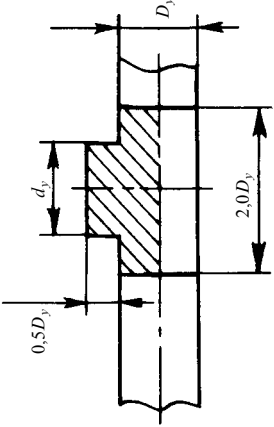
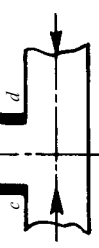
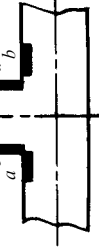

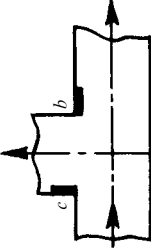
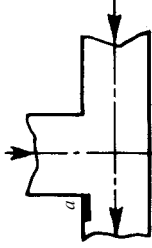
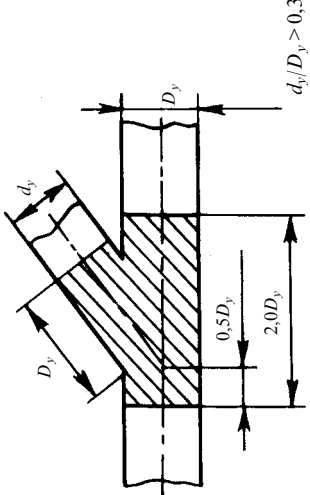
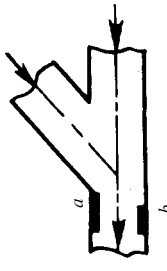
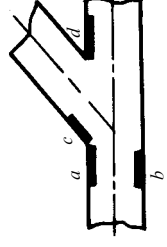
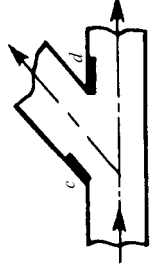
Appendix 2

Nos.	Extent of control zones	Version	Control locations		Record of control locations	Notes
			Version of flow direction	Unknown flow direction		
Axial-asymmetric components (flows)						
V					V — a; V — b	The location of the maximum wear "b" behind a flange and sleeve joint is closer to the joint than with a nipple joint.
VI					VI — a; VI — b;	The location of the maximum wear "b" behind a slide valve is closer to the latter than behind a valve.
VII					VII — a; VII — b	Orifice plates, diaphragms, as well as transitions for flow constriction or opening with an aperture angle ≤10°. Ditto, transitions with an aperture angle > 10°.

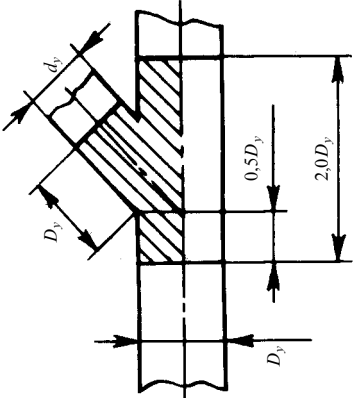
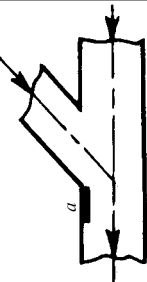
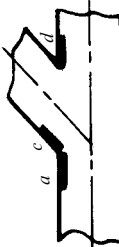
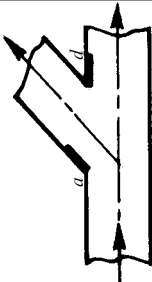
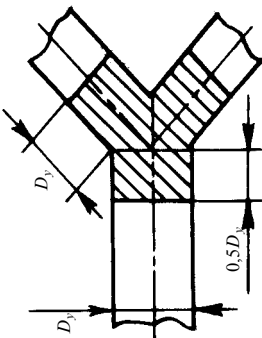
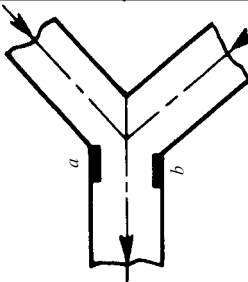
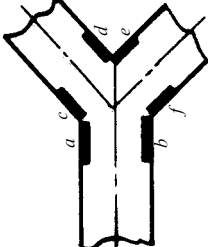
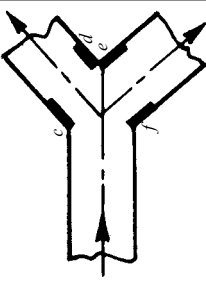
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Nos.	Extent of control zones	Version	Control locations		Record of control locations	Notes
			Version of flow direction	Unknown flow direction		
VIII					VIII	
Axial-asymmetric components (flows)						
IX		A			IX - A - c; IX - A - d IX - B - a; IX - B - b; IX - B - e IX - C - c; IX - C - b IX - D - a; IX - D - e	
			B			
			C			
			D			

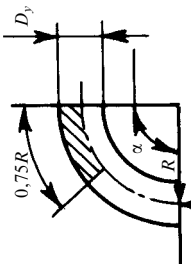
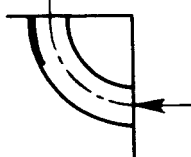
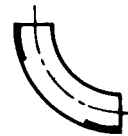
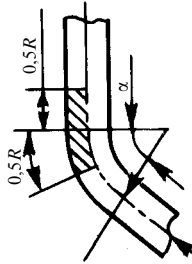
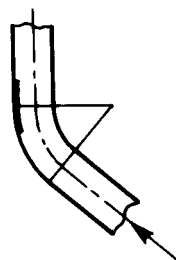
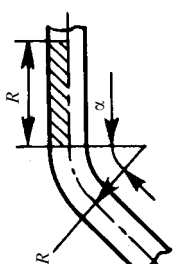
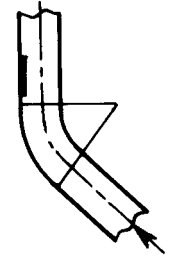
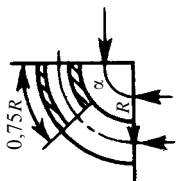
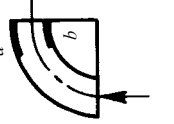

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Nos.	Extent of control zones	Version	Control locations		Record of control locations	Notes
			Version of flow direction	Unknown flow direction		
X	 $d_y/D_y \leq 0,3$	A			X - A - c; X - A - d	
		B			X - B - a; X - B - b	
		C			X - C - c; X - C - b	
		D			X - D - a	
XI	 $d_y/D_y > 0,3$	A			XI - A - a; XI - A - b	
		B			XI - B - c; XI - B - d	

Continued

Nos.	Extent of control zones	Version	Control locations		Record of control locations	Notes
			Version of flow direction	Unknown flow direction		
XII	 $d_y/D_y \leq 0.3$	A			XII - A - a	
		B			XII - B - c; XII - B - d	
XIII		C			XIII - A - a; XIII - A - b;	
		B			XIII - B - c; XIII - B - d; XIII - B - e; XIII - B - f	

Continued

Nos.	Extent of control zones	Version	Control locations		Record of control locations	Notes
			Version of flow direction	Unknown flow direction		
XIV	 $R \geq 2D_y; 90^\circ \geq \alpha > 60^\circ$	A			XIV - A	
	 $R \geq 2D_y; 60^\circ \geq \alpha > 30^\circ$	B			XIV - B	
	 $R \geq 2D_y; \alpha \leq 30^\circ$	C			XIV - C	
XV	 $R < 2D_y; 90^\circ \geq \alpha > 60^\circ$	A			XV - A - a; XV - A - b	

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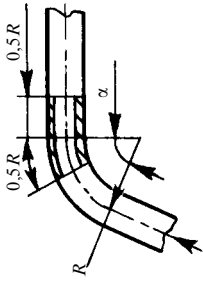
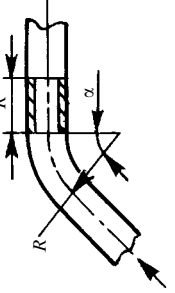
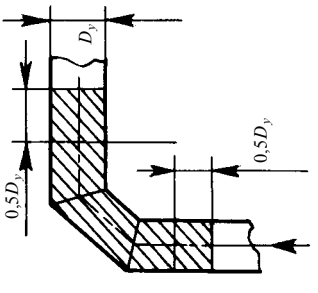
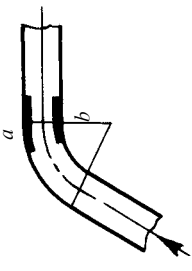
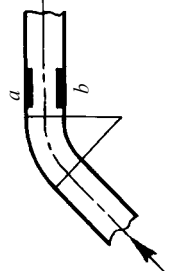
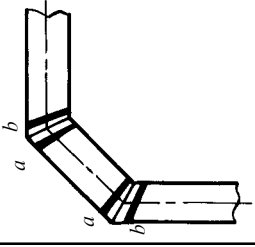
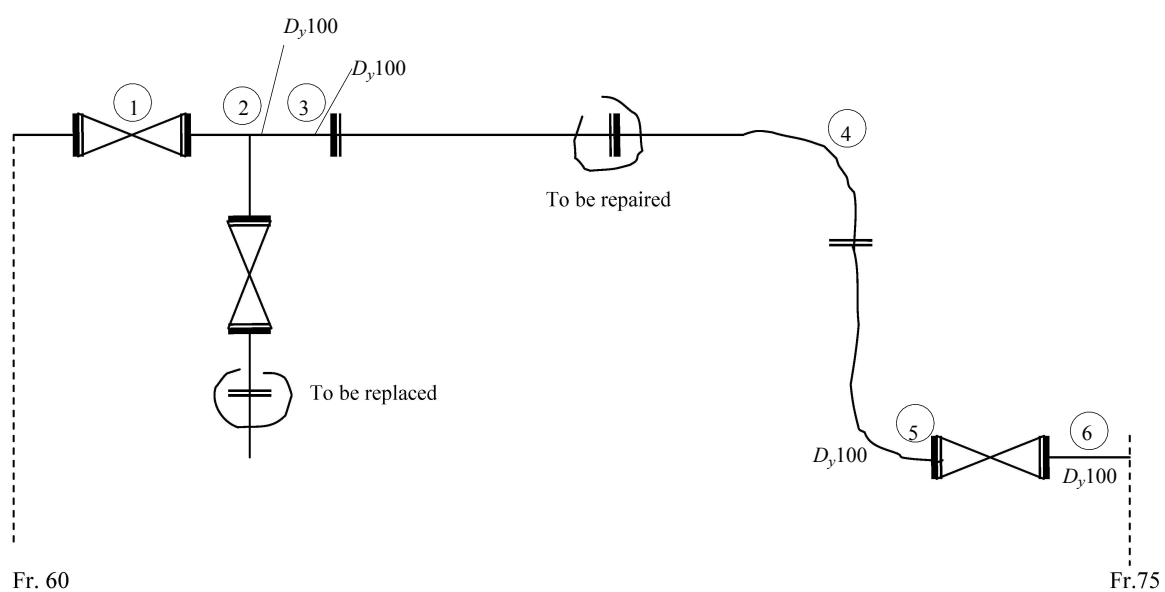
Nos.	Extent of control zones	Version	Control locations		Record of control locations	Notes
			Version of flow direction	Unknown flow direction		
XVI	 $R \geq 2D_y$; $60^\circ \geq \alpha > 30^\circ$  $R < 2D_y$; $\alpha \leq 30^\circ$ 	B	 		XV - B - a; XV - B - b	
		C			XV - C - a; XV - C - b	
					XVI - a; XVI - b	

Diagram of a pipeline for evaluating the technical condition

Ship's name _____

Date of measurements _____

Section of a seawater cooling system between frames 60 and 75 (SB)



27. PROCEDURE FOR CARRYING OUT SURVEYS OF SHIPS IN SERVICE ON THE INITIATIVE OF THE REGISTER (INITIATIVE SURVEYS)

1 GENERAL

1.1 This Procedure defines the procedure and the required scope of surveys on the initiative of the Register (hereinafter, initiative surveys) further to the provisions of 3.1.8, Part I "General Provisions" of the Guidelines. The provisions of this Procedure shall not supersede the requirements of the Rules, Guidelines, or other normative documents of the Register relating to technical supervision of ships in service. The performance of the initiative surveys shall be primarily guided by the requirements of international conventions applicable to the ship concerned on the basis of the date on which the keel was laid.

1.2 Initiative surveys of ships or individual items of technical supervision on board ships are performed by the Register to preclude the detection of deficiencies by PCS or flag State Maritime Administrations during ships inspections, or to eliminate existing deficiencies.

1.3 In selecting ships for initiative surveys, consideration shall be given to the following:

deficiencies identified during inspections of sister ships;

deficiencies identified during inspection of the ship concerned, to select the items and the scope of the initiative survey;

Register-related deficiencies. These are a major consideration in selecting a ship or the items of survey; shipowner's attitude toward ensuring safety of navigation, which is established on the basis of review of statistics of identified deficiencies, their causes and measures taken to eliminate deficiencies;

age of ship (most deficiencies are identified on ships over 15 years of age).

1.4 Initiative surveys fall within occasional surveys to which items of technical supervision with highest PSC deficiency rates shall be subjected.

1.5 Initiative surveys can also be regarded as practical assistance to shipowners in the preparation of ships for PSC inspections, bearing in mind the Register experience with such inspections. This work shall be entrusted to the most experienced surveyors familiar with specific features of inspections performed by PSC or Flag State Maritime Administrations.

1.6 Prior to the commencement of initiative survey, the Branch Office shall notify the shipowner or ship management of the purpose and scope of the occasional survey and, at least 12 h before the survey (in particular cases, where the ship's stay in port is not more than 12 h, 1 to 2 h before the survey) to agree with the shipowner the place and the time of survey, taking into account both the shipowner's (charterer's, crew's, etc.) interests and the interests of the flag State Maritime Administration and the Register, matters relating to the safety of navigation and prevention of marine pollution. It is the responsibility of the shipowner to notify the Master of the date and purpose of visit by Register surveyors, prepare the ship items for the survey and make necessary arrangements for the performance of the survey.

1.7 A decision to perform initiative survey may be taken only by the Register Head Office or the management of a Branch Office.

1.8 Initiative survey shall be performed:

upon receipt of confirmed information that the ship made a voyage outside the specified area of navigation, or did not observe the navigation conditions, or was not used for its intended purpose;

after detention of ship by PSC;

on the basis of a statement by PSC, flag State Maritime Administration, or crew members about defects on board that pose a threat to the safety of navigation, human life or the environment;

on the basis of information of typical defects in sister ships that pose a threat to the safety of navigation, human life or the environment;

on ships that systematically violate the requirements established by the Register (suspension of ship's class, cancellation of statutory certificates, major deficiencies identified during periodical surveys, and the outstanding RS requirements, non-timely presentation for survey of items of technical supervision, in case of substantial renewals, conversion or repair without the RS supervision, etc.);

on ships having unsatisfactory appearance (for example, absence or significant degradation of paint coating of the above-water part of the hull, superstructures and deckhouses), apparent defects of life-saving appliances, fire-fighting equipment, loss of contrast of the load line marking, etc.

Additionally, initiative survey can result from instructions from the Register Head Office to check the technical condition of those items of technical supervision that have been found to be deficient in sister ships.

1.9 Initiative survey shall, where practicable, be carried out at any ship survey, i.e., items of technical supervision not pertaining to the type of survey concerned shall also be checked (but not included in the invoice for the survey).

1.10 The scope of occasional survey shall be specified by the Register on a case by case basis, taking into consideration the causes and purposes of the initiative survey, and it can comprise both an overall survey of ship and a close-up survey of individual items including operational tests and trials where necessary. In any case, the Surveyor primarily familiarizes with the classification and statutory certificates carried on board to verify their periods of validity, presence of outstanding Register requirements, etc., and with the last PSC inspection reports.

The scope of initiative survey shall comprise an operation test and/or external examination of those items of technical supervision that most commonly cause ship detentions during PSC inspections (as a rule, life-saving appliances, fire-fighting equipment and outfit, nautical publications).

1.11 A Report (Form 6.3.10) is to be drawn up based on the results of the initiative survey where all the requirements (if any) are to be entered. The Report is delivered to the Master with copies forwarded to the shipowner and to the RS Branch Office for in-service supervision.

1.12 If major deficiencies are identified during the survey that affect the safety of navigation and prevention of pollution of the marine environment, in particular, relating to those items of technical supervision whose survey was not covered by the scope of survey specified earlier, relevant statutory documents shall be cancelled and/or class suspended (refer to Section 4, Part II "Carrying out Classification Survey of Ships " and 4.2.3, Part III "Survey of Ships in compliance with International Conventions, Codes, Resolutions and Rules for the Equipment of Sea-Going Ships" of the Guidelines). The scope of the occasional survey shall be extended in this case.

1.13 If an owner/ship management decline, without any grounds, to have initiative survey performed, the Branch Office will notify the shipowner in writing of possible suspension of the ship's class pending fulfillment of the Register requirement to perform the said survey. A refusal shall be treated as ungrounded if ship management or shipowner fail to present to initiative survey a ship subject to the requirements of 1.8. Moreover, the Branch Office can involve representatives of the port Maritime Administration, notifying them in advance, to perform joint survey of the ship.

Any disputes relating to the performance of initiative surveys shall be settled by:

the flag State Maritime Administration (issues regulated by international conventions and agreements);
the Register Head Office (issues regulated by the Register Rules).

1.14 No fee shall be charged for initiative survey, but subsequent surveys for rectification of deficiencies and fulfillment of requirements imposed during the initiative survey shall be charged on a general basis, on the basis of the time input.

2 PERFORMANCE OF SURVEYS

At initiative surveys, consideration shall be given to the following (having regard to the requirements of 1.9, 1.10).

2.1 Hull.

2.1.1 The following shall be checked at bulwark survey:

condition of bulwark plating for indents, ruptures, penetration corrosion at the lower part of the plates; bulwark stays (for cracks in way of welding to deck; for deformation leading to loss of buckling strength, for deformation of the plates supporting the stays; wastage in way of air and drain holes);

operability of freeing ports, and side ports for pilot embarkation (if any), their closing appliances, locks;

overall deformation of bulwark (to be evaluated visually);

where guard rails are provided, the vertical distance between the courses of rails and their overall condition, security of attachment of the stanchions to ship structures;

at areas where mooring arrangements are located, check for damage to bulwark and bulwark fenders in way of passage of mooring ropes.

2.1.2 The following shall be checked at cargo holds survey:

condition of inner surfaces of structures in holds and compartments where the type of the cargo carried (coal, mineral fertilizers, ore, various petroleum products, salt, chemicals, acid, fish in barrels, etc.) is such that corrosion is likely to occur, in pump rooms of oil tankers (where heating pipelines are laid), in bilges, in compartments having cement and other types of coatings, in bilge wells, and in areas liable to sweating, inadequate ventilation and excessive humidity, where maintenance is difficult during operation (dry compartments under engine room, plating under suctions, etc.). To be examined for wastage are also hull structural members having small as-built thickness, especially at the fore and after ends in way of wind and water strike, and plates with permitted reduction in thickness due to the use of approved corrosion prevention means.

Additionally, the sides of ships that pass through locks, confined waters, channels, and ships with a large bow flare shall be examined for deformation;

bottom shall be examined for deformation in ships that operate in shallow waters, pass through rivers and channels, and are placed for drying and inspection at river estuaries at low tide; in the underwater part of the side, welding joints of plates, and the area adjacent to welding joints in way of connection of framing members to the plating, shall be inspected for grooving corrosion. (Such inspection shall be performed if the initiative survey coincides with the specified docking survey of the ship);

check for cracks in the fore and after end structures, including forecastle; check for excessive corrugation and linear wear on ice strike plates, especially in way of transition from the fore run to the middle body, and in the after end; the condition of framing in the holds/tanks selected for inspection (foremost, one in the middle part of the ship's length, aftermost); bilge brackets for tearing from inner bottom plating; check for deformation and cracks in frames and frame brackets, as well as primary longitudinal members, their intersections with various frames and transverse bulkheads, check for damage to side stringers and 'tween decks in way of abutting the side and the collision bulkhead;

bilge wells shall be checked for corrosion of lower parts, penetration corrosion and cracks in suction pipes; technical condition of strum boxes on suction pipes and bilge well covers; condition and protection of sounding pipes and air pipes from damage by cargo; adequacy of the inner bottom plating given the cargo carried;

lower parts of bulkheads in cargo holds/tanks that shall be hammered to detect penetration corrosion or wastage in excess of the allowable limit, especially in way of welding of the inner bottom plating. To hammer thoroughly the lower parts of watertight bulkheads in way of welded connections of 'tween decks. To check for cracks and deformations in way of connection between the transverse bulkheads and the side in way of ice strike and at places liable to intensive wear at mooring operations. The lower part of corrugated bulkheads and the area approximately at their mid height, as well as weld connections of

corrugations, shall be checked for corrosion, and the intersections of the bottom centre girder with transverse bulkheads, centre tanks floor connections to longitudinal bulkheads (especially in case of corrugated bulkheads) shall be checked for cracks. In oil tankers, the plating of longitudinal and transverse bulkheads, as well as the inner skin on the side opposite to the welding joints of frames, shall be checked for grooving corrosion and cracks. In ships carrying bulk cargo with a low stowage factor, where percussive cleaning of bulkheads is carried out, and in timber carriers, bulkheads shall be checked for deformations and cracks. In bulk carriers and ore/oil carriers, the weld connections between shedder plates fitted above stools and the transverse bulkhead corrugations shall be checked for cracks;

check for wear and cracks at 'tween decks in way of frame penetrations;

at inspection of inner bottom plating, check for availability of doubling plates in way of indents and holes, and check for inner bottom plating deformation (indents, bulges in excess of allowable limits) and cracks at deformed areas.

2.1.3 The following shall be checked at survey of ballast tanks:

manholes, manhole gaskets, pins with nuts shall be checked for damage. All manhole fastening bolts shall be free of mechanical or other kind of damage;

ballast tanks above the inner bottom shall be checked for cracks in deep members and wash bulkhead, as well as for condition of sounding pipes, ballast system valves and remote controls;

at fore peak and after peak examination, to check the condition of non-tight platforms, especially in way of openings for frames, condition of stiffening brackets (they shall be free of extensive corrosion, cracks, deformations). At examination of fore peak deck, to hammer its weld connections to the collision bulkhead and chain locker. The internal division of chain locker shall be free of holes caused by corrosion, especially in way of openings which form a kind of ladder. At fore peak examination, specific attention shall be paid to the condition of ladders leading to tanks;

floors in bottom ballast tanks that shall be free of cracks in way of bottom side girder penetrations. In way of stiffening brackets weld connections, check for welding defects in way of air and drain holes, and check areas of likely occurrence of extensive pitting corrosion in way of sounding pipes and systems suction;

in deep (two-tiered) bottom tanks, check the condition of steel tubular pillars (for corrosion), and check for tearing off platforms, framing members, especially in way of brackets, due to tanks over pressing at ship ballasting. At wing ballast tank examination, check the condition of platforms, cross ties, brackets, especially in way of wind and water strake (for deformation and detachment at mooring), connections between cross ties and web frames.

check for cracks and deformations in way of connections between transverse bulkheads and bottom and side at fore end, as well as in tanks that may be slack.

Double bottom spaces under boilers or those alternately used for oil fuel and ballast, and chain locker, shall be free of extensive corrosion.

2.1.4 The following shall be checked at survey of upper deck, open areas of superstructure and deckhouse decks:

examine for corrosive attack at connections between deck and forecastle transverse bulkhead; check for possible wastage, up to through holes, in the midship region between holds; the same shall be done in way of deck cabins in the ship's midship region;

on the forecastle deck, check windlass seatings, mooring winches, mooring hawses seatings, fairleads and mooring bollards;

on the upper deck, check hold coamings stiffeners and seatings under attachments of top hatch covers;

check lower parts of ventilating cowls on the upper deck that can show significant corrosion, ventilator heads that can be exposed to corrosive attack in way of attachment to cowl;

outside stairways from upper deck to other decks that often show corrosion in lower parts up to penetration corrosion;

at examination of sounding pipes on upper deck, check availability of plugs on sounding pipes and their condition;

at upper deck examination, check for indents and bulges in way of sheer strake that can have been sustained at ship moorings;

- check waterways for penetration corrosion and mechanical damage;
- at survey of superstructure deck, and lower edges of superstructure sides and end bulkheads, check for penetration corrosion or cement boxes (use hammer);
- on tankers upper deck, check areas where decks are pierced by heating pipelines to detect locations of possible deck plating wastage (up to penetration corrosion);
- on ships with continuous hatch side coamings of cargo holds, check for cracks at coamings ends and in the midship region, as well as at corners of hatch openings in way of connection with hatch end coamings;
- on ships of river-sea navigation, check areas of likely cracks occurrence (locations where stiffening doubling bars are fitted, deck plating in way of ballast tank hatches);
- check areas of extensive corrosion in way of companion hatch covers, ventilating trunk covers, air pipes, and operability of securing devices;
- upper edge of sheer strake, especially in way of change in hull girder section;
- check for extensive wastage of deck plating under deck machinery in fore end, in way of scuppers, ventilation duct coamings at hull elements where service experience indicates presence of trapped water;
- areas of transition from sheer strake to superstructure, at superstructures and deckhouses ends, intersections of deck longitudinals with deck transverses shall be checked for cracks;
- on dry cargo carriers, forecastle plating and stiffening framing shall be checked for cracks, and deck and coamings in way of derricks shall be checked for deformation;
- on ships carrying cargo in bulk where loading and discharge operations are performed by grabs, and on timber carriers, deck plating and framing shall be checked for deformation;
- on tankers, the contour of openings in deck plating in way of expansion tanks, especially in the case of scalloped weld type, shall be checked for cracks;
- check mooring ropes for damage or excessive wear.

2.1.5 The following shall be checked at survey of engine and boiler room:

- check auxiliary boiler seatings for corrosion, and attachments for fatigue cracks;
- in propeller shaft tunnel, check engine room grating, and check plating for penetration corrosion. Protective enclosures shall be fitted in shaft line at intermediate shaft connections;
- check guard rails on stairways and intermediate platforms for damage;
- check fuel tank sounding pipes for presence of self-closing valves;
- check hot well and cover for excessive corrosion;
- at examination of independent tanks of feed and potable water, check condition of walls at 2/3 depth from bottom, which is an area of likely corrosion, and check areas of welded fittings for valves (especially level gauges);
- check condition of sea valve filter casings including hammering and check operability of discharge valves and filter cells. Filter cells shall be free of corrosion, cover attachments shall be free of defects;
- condition of control cocks on fuel tank sounding pipes, presence of threaded covers on pipes;
- condition of fire dampers and compliance of their actual arrangement with that indicated on the fire plan;
- there shall be no cement boxes on outer shell, or significant wastage of sea chests and discharge boxes;
- visual examination shall be carried out of condition of distance pieces of bottom and side valves, especially in way of weld joints, for corrosion and cracks;
- means of escape shall be checked for lighting, marking with IMO symbols and obstruction;
- engine and boiler room shall be checked for cleanness, excessive amounts of oily mixture in bilges, pipe tunnels and on pipelines insulation.

2.1.6 The following shall be checked at hold covers survey:

- at examination of top hatch covers, check the condition of grooves for packing rubber (there shall be no penetration corrosion either on the inside or on the outside). Edges shall not be crumpled. Deformation of packing rubber shall not exceed limit residual deformation. Specific attention shall be paid to the wear of hatch covers, condition of cover securing devices, efficiency of sealing between cover sections;
- when moving hatch covers, check that there is no scuffing of packing rubber against the coaming collar, especially at corners of hatch covers;

cover edges shall be checked for penetration corrosion in way of weld connections of supports for securing devices;

compression bar and condition of grooves shall be checked for overall corrosion and for integrity of packing gaskets;

groove edges of hatch covers, hydraulic system valves attachments shall be checked for extensive corrosion and penetration corrosion (to hammer);

at examination of portable plates of hydraulic cylinders closing appliances, check integrity of plate, gasket, attachment, presence of lubricating oil leaks. Check integrity of pipelines and hydraulic hoses of hatch cover hydraulic system, closing appliances, opening/closing controls. On ships where the hatch covers are of rolling type, hoisting and retaining hydraulic cylinders, supports shall be examined for lubricating oil leaks at seals;

hatch cover ventilating openings shall be securely closed with covers or non-return valves. Special examination shall be performed of top hatch cover framing for impact damage. Top cover fastening brackets are generally exposed to corrosion at walls;

at opening and closing of covers, check for operability, for clearances in guide wheel bearings (around 0,3 mm), for excessive clearances. There shall be no longitudinal clearance in hinged joints (in hinges);

hatch covers ventilating openings shall be securely closed with covers or non-return valves. Special examination shall be performed of top hatch cover framing for impact damage. Top cover fastening brackets are generally exposed to corrosion at webs.

2.1.7 The following shall be checked at 'tween deck covers surveys:

check for ruptures in plates, indents resulting in loss of buckling strength. "Flaps" preventing ingress of loose cargoes shall be in place and free of damage. Check for excessive deformation, especially in way of connection with transverse bulkheads (along brackets), in fendering tubular structures preventing 'tween deck covers damage during cargo handling operations. Check portable plates of hydraulic cylinders closing appliances and flexible hoses for damage or lubricating oil traces;

check cargo hold hatchway guard rails for damage.

Where covers are closed with the use of ropes, provision shall be made for enclosures. Ropes shall not show limit wear. To be examined for wear are also drive sheaves, their cheeks and snatch blocks, as well as pressure lubricators for operability.

2.1.8 On ships with a towing arrangement, check towing hook release (remote controlled and by limit values of rope tension).

2.1.9 Special attention shall be paid to the coating of outer hull structures, since it is the coating condition that generally causes extended PSC inspection under the provisions of Paris and Tokyo MOUs.

2.2 Machinery.

During survey, check opening/closing of engine room capes, ascertain that glass is free of cracks.

Check remote operation of quick-closing valves on fuel tanks.

Check condition of suction and discharge hoses of bilge pumps driven by lifeboat engines, and of manual bilge pumps. Ascertain that discharge hoses are of sufficient length.

Check CO₂ pipelines in holds (fastening and absence of damage).

Check that schedule for instruments calibration is observed.

Ascertain that there is a box with a key on door for opening fire extinction station.

Ascertain that there are flame screens on ventilator heads of fuel oil and lubricating oil tanks.

Check availability of protective enclosures on lifeboat engines.

Check availability and condition of protective screen on high pressure fuel lines of internal combustion engines.

Check integrity and absence of clamps on open deck fire mains, as well as suction and discharge branches and bottom and side valves. Examine main and auxiliary engine sea water cooling pipelines.

Ascertain that fuel pipelines are efficiently attached and free of clamps.

Ascertain steady operation of diesel generators (load switching-off, switching-on).

Ascertain operability of diesel generator speed governor.

Check availability of tachometers on diesel generator and instrumentation.

Ascertain that flexible joints of fuel and lubricating oil systems are free of cracks or damage.

Check closing up of sliding doors from local control station.

Pay attention to attachment of engine room plating.

Check condition of exhaust gas pipes insulation and availability of screen to prevent fuel or lubricating oil from getting onto insulation or hot surfaces.

Check availability of spare parts in appropriate quantities (for ships of unrestricted area of navigation and ships of restricted area of navigation A1).

Carry out operation test on drives of ventilation ducts closing appliances.

Carry out operation test on 15 ppm bilge separator. Check activation of 15 ppm bilge alarm signal at watch keeping station.

Check separation of pipelines of oil residues tanks and bilge water tanks, with the exception of common pipeline to discharge connection.

Check availability of SOPEP and its conformity to the actual items of equipment for the prevention of pollution from ships, including verification of conformity of receptacles and arrangement of holding tanks.

Check availability of standard discharge connection for discharge of bilge water and sewage (with identification plates).

Check availability of Certificates of Conformity and Type Approval Certificates (Type Test Certificates) for the equipment for the prevention of pollution from ships.

Check availability of Oil Record Book.

Check remote control of boiler shut-off valve and remote opening of boiler safety valves.

Carry out pressure air test of CO₂ system and other gas fire-extinguishing systems.

Ascertain that there are no extraneous objects in CO₂ room.

Check availability of thermometer in CO₂ room that is readily visible through the window.

Check level gauge glasses on fuel and lubricating oil tanks for leakage.

Check that enclosures are in place on moving parts of machinery.

Check that there is a steering engine manual control change over scheme posted in steering gear compartment.

3 ELECTRICAL EQUIPMENT

3.1 The following shall be checked at survey of sources of electrical power (generating sets):

activation of protection against reverse power;

ability of generating sets to run in parallel and load transfer capability from one generating set to another;

3.2 The following shall be checked at survey of emergency generating sets:

ability to be automatically started with the use of two kinds of starting devices;

time of diesel engine automatic starting and receiving of load from generating set (not to exceed 45 s);

ability of automatic device to provide for a sufficient air supply to automatically started emergency generating set.

3.3 The following shall be checked at survey of accumulator batteries and battery rooms:

automatic switching on of accumulator batteries that are an emergency (emergency transitional) source of electrical power in case of ship main deenergizing;

interlocking of mechanical ventilation with a charging device;

good working order of steam radiator in accumulator battery room;

condition of safe-type lighting fittings;

check that the accumulator battery room is clean and free of extraneous objects, check availability of accumulator battery operation manual;

availability of a warning notice indicating explosion hazard on or in the vicinity of accumulator battery room doors.

3.4 The following shall be checked at survey of cabling:

availability of packing compounds in places where cable runs are led from the superstructure onto the open deck;

fastening of cable runs and protective casings along cargo hold coamings;

availability of packing in pipes with cable for connection to electric drives on open deck, condition of pipes (corrosion).

3.5 The following shall be checked at survey of power mains:

condition of casings of power rotary switches on foundations of cargo cranes and safety switches in main current circuit of lifeboat winch electric drive;

condition of casings of electric drives of cargo-handling gear and mooring arrangements;

availability of power rotary switch handles (of cargo cranes, electrohydraulic sliding doors).

3.6 The following shall be checked at survey of lighting:

availability of permanently installed lighting fixtures on cargo cranes;

absence of cracks and broken glass in lighting fixtures on open decks;

lighting of muster and embarkation stations for boarding life-saving appliances on deck and overboard and escape routes;

adequacy of lighting on the vessel (availability of bulbs);

condition of rotating lights for overboard spaces;

absence of cracks in searchlight glasses on upper bridge;

availability of bulbs in the Suez Canal searchlight;

possibility of remote switching off of external lighting from the bridge;

condition and functioning of flame-proof lighting fixtures, including operation of interlocks.

3.7 The following shall be checked at survey of automation equipment and alarms:

availability of alarm electric lamps and protective caps on panels;

possibility of remote or local operation of emergency fire pump.

3.8 The following shall be checked at survey of navigation lights:

fitting of electric lamps of adequate capacity;

adequacy of navigation lights mounting;

efficient working order of navigation lights commutator;

contamination (paint) of glass hoods of navigation lights (especially of side lights);

availability of passports or certificates of conformity for the navigation lights fitted;

availability and efficient working order of daylight signalling lamp.

3.9 The following shall be checked at survey of general alarm and fire alarm;

availability and condition of permanently installed sound devices on open deck and superstructure;

availability of glass panels and lamps for illumination of fire alarm call points (especially on open deck);

3.10 At survey of telephony, internal service communication shall be checked in the following spaces: steering gear compartment, emergency diesel-generator space, fire smothering station.

3.11 The following shall be checked at survey of electric drives:

electric drive operation and steering engine control, including alarm activation;

operation of anchor arrangement electric drive, in particular, operation of electromagnetic brakes, emergency switch and zero protection.

4 RADIO AND NAVIGATIONAL EQUIPMENT

4.1 The following shall be checked at survey of radar transponders:

presence of IMO symbol "radar transponder" at the place of mounting of the radar transponder, free access thereto;

conformity of the expiry date marked on the exterior of the radar transponder to the batteries expiry date;

availability of documentary evidence of annual verification of radar transponder in radar transponder file;

availability of brief operating instructions on the exterior of the radar transponder;
availability in lifeboats of permanent locations for radar transponder mounting.

4.2 The following shall be checked at survey of COSPAS-SARSAT satellite emergency position-indicating radio beacons:

- availability of EPIRB Annual Test Report;
- availability of Test Report for Satellite EPIRB Automatic Float-Free Release Arrangement (to be carried out at least every two years);
- availability of IMO symbol "Emergency position-indicating radio beacons" at the place of mounting of the EPIRB;
- marking of the date of battery replacement on the exterior of the EPIRB and of the date of check or replacement of the automatic release arrangement;
- conformity of the expiry date marked on the exterior of the EPIRB to the batteries expiry date;
- availability of certificate of registration of the EPIRB in the COSPAS Mission Centre,
- availability of brief operating instructions on the exterior of the EPIRB;
- condition of the EPIRB painting or marking.

4.3 At survey of two-way VHF radiotelephone apparatus for survival craft, check integrity of casing, availability of arrangements for fastening to clothes, and availability of special primary batteries for radio stations.

4.4 The following shall be checked at survey of aerials:

- absence of chipping, cracks and traces of paint on aerial insulators;
- availability of enclosures (where necessary) around aerial leads to radio room;
- absence of corrosion on aerial halyards and broken rope strands.

4.5 Ascertain efficient working order of radar, log, echo sounder, gyrocompass, availability of lighting and integrity of protective glass on magnetic compass on the upper bridge.

4.6 General.

Check availability of license for ship's radio equipment.

Check the correspondence of the number of radio specialists on board ship to the requirements of the Flag State Administration, as well as qualification of the radio specialists (whether the radio specialists possess respective GMDSS General Operator Certificates/ First and Second Class Radio Electronic Certificates).

Availability on ships fitted with GMDSS equipment of a List of Documents on Radio Communication and Electrical Navigation as per Order of the RF Ministry of Transport No. 79 dated 30 June 1998 (not later than 1 January 1999).

For all ships: particular attention shall be paid to availability of recent nautical publications, charts, ITU publications (volumes IV, V, VI, VIIA).

Use is recommended of Equipment and Outfit Survey Checklist during initiative surveys.

EQUIPMENT AND OUTFIT SURVEY CHECKLIST

Nos	Item of technical supervision	Notes
1	Lifeboats and rescue boats (SOLAS-74 Reg. III/41-48) Check condition of hull from inside and from outside, condition of boat covers, availability of skates, availability of air in air bottles of tanker lifeboats, dates of bottles testing; condition of water spray system (cover for protecting occupants and rigging for open boats as per SOLAS 60 and cover for protecting occupants for partially enclosed lifeboats as per 1983 Amendments). Check availability of buoyant lifeline on both sides (where required). Availability of retro-reflective tapes on hull (sides, bottom, deckhouse cover, for adequacy of area covered). Check lower parts of boat's launching and recovery arrangement components that are likely to show extensive corrosion. Check entries in ship logs regarding timely completion of specified checks, drills, training. Pay attention to availability of free access to positions where the boats are stowed (obstruction by extraneous objects). Carry out engine operation test, check seating, exhaust pipe (possibility of manual starting from cold). Check propeller, shaft line, clutch, possibility of reversing in operation. Condition of rudder stock, rudder, tiller, stern frame. Condition of transverse and side thwarts, crutches, oars, gunwale. Availability of marking and its compliance with SOLAS 74. Availability of bottom plugs. Technical condition of pump and hoses. Condition of hull at davits areas. Condition of simultaneous hook release mechanism. Availability and condition of fire-retardant casing around engine. Availability of propeller guard. Availability and condition of launching remote control	
2	Lifeboat equipment (SOLAS 74 Reg. III/41) As per regulations (listed in Record of Approved Equipment, Form 4.1.2)	Food ration expiry date: Smoke signal expiry date: S — P — Rocket parachute flares expiry date: S — P — Hand flares expiry date: S — P — Date of next fire extinguisher check: S — P —
3	Launching appliances of lifeboats and rescue boats (SOLAS-74 Reg. III/48) Overall examination of launching appliances: check condition of metal structures, foundations; check launching appliances for corrosion; check bolts, chains, rollers and all loose gear; operation test of winches, brakes, hand gear (mechanical, hydraulic, pneumatic) by boat launching; date of renewal of falls (every 5 years); condition of embarkation ladders and date of their testing; check availability of two lifelines on davit span (for open and partially enclosed liferafts); operation test of emergency lighting on lifeboat deck; check efficient working order of lifeboats and rescue boats launching controls located in the boats (where applicable); check interlocking of lifeboat winch hand gear when the brakes are off and the electric drive is on; check availability of maintenance manual, spare parts and materials for repairs	Date of next renewal of falls: S — P — Date of next turning: S — P —
4	Inflatable liferafts and launching appliances (SOLAS-74 Reg. III/38; 39) Frequency of inflatable liferafts checks – every 12 months. Frequency of hydrostatic release unit checks – every 12 months. Check marking of liferaft containers. Check condition and date of checking. Check adequacy of stowage of liferafts, availability of weak link and painter; pockets secured to liferaft with ship particulars, adequacy of painter attachment to ship hull	Next survey of liferafts: S — P — of hydrostatic release units: S — P —
5	Lifejackets, immersion suits, thermal protective aids (SOLAS-74 Reg. III/31; 32; 33) Ascertain that there is a lifejacket available for each crew member and persons on watch, check that the lifejackets are fitted with retro-reflective tapes, lights with batteries, whistles, availability of Certificate of Compliance with the Requirements of SOLAS 74.	Batteries expiry date: Date of previous check of lifejackets:

Continued

Nos	Item of technical supervision	Notes
	<p>Check batteries expiry dates.</p> <p>Check lifejackets marking.</p> <p>Check availability, condition and readiness for immediate use of immersion suits. There shall be at least 3 immersion suits for every lifeboat (with the exception of totally enclosed lifeboats), availability of Certificate of Compliance with the Requirements of SOLAS 74.</p> <p>Check availability, condition and readiness for immediate use of thermal protective aids for persons on board who are not provided with immersion suits, availability of Certificate of Compliance with the Requirements of SOLAS 74</p>	<p>Date of previous check of immersion suits:</p> <p>Date of manufacture of thermal protective aid:</p>
6	<p>Lifebuoys (SOLAS-74 Reg. III/21 or III/7.1; 27.1; 31)</p> <p>Ascertain that there is a lifebuoy with a self-igniting light on either side of the ship.</p> <p>Carry out visual check of self-igniting lights luminous intensity.</p> <p>Ascertain that there is a lifebuoy with a line of over 27,5 m in length on either side.</p> <p>Ascertain that there are two lifebuoys with combined self-igniting light and self-activating smoke signals and with quick release arrangement on bridge wings.</p> <p>Check expiry dates of combined self-igniting light and self-activating smoke signals and efficient working order of release arrangement.</p> <p>Check adequacy of the number of lifebuoys depending on the ship's length and purpose:</p> <p>For cargo ships:</p> <ul style="list-style-type: none"> ship length up to 100 m – 8; ship length 100 m – 150 m – 10; ship length 150 m – 200 m – 12; ship length over 200 m – 14. <p>For Passenger ships:</p> <ul style="list-style-type: none"> ship length up to 60 m – 8; ship length up 60 to 120 m – 12; ship length up 120 to 180 m – 18; ship length up 180 to 240 m – 24; ship length over 240 m – 30. <p>Check that at least half of the total number of lifebuoys are fitted with self-igniting lights.</p> <p>Check that lifebuoys with combined self-igniting light and self-activating smoke signals fitted on bridge wings are capable of releasing the smoke signal from its stowage position and have a mass of not less than 4 kg</p>	<p>Date of manufacture of lifebuoys and their check at the station:</p> <p>Self-igniting lights expiry date:</p> <p>Self-activating smoke signals expiry date:</p>
7	<p>Main fire pump (SOLAS-74 Reg. II-2/4)</p> <p>Operation test.</p> <p>Check working pressure, packing.</p> <p>Check that manometers on pumps are in working order and have been appropriately tested</p> <p>Ascertain that the driving electric motor is in appropriate technical condition (insulation resistance, bearings)</p>	
8	<p>Emergency fire pump (SOLAS-74 Reg. II-2/4)</p> <p>Emergency fire pump driving motor test:</p> <ul style="list-style-type: none"> test motor start-up (6 times in 30 min and at least 2 times over the first 10 min) and running, including remote starting of the fire pump (where applicable); test pre-heating arrangement for starting from cold, if fitted; ascertain that service tank capacity is sufficient to enable the pump to operate under full load during 3 hrs; <p>Ascertain that outside the main fire pump room, there is a sufficient stock of fuel to enable the pump to operate during another 15 hrs.</p> <p>Pump test:</p> <ul style="list-style-type: none"> pump operation test: seals, absence of leaks, non-return valve; operation test for isolating valves and their drives; pump operation test under working pressure during not less than 20 min. <p>Check spaces where emergency fire pump is fitted:</p> <ul style="list-style-type: none"> ascertain that space enclosures are insulated in accordance with the structural fire protection requirements for this type of space; Ascertain that in case of direct access from machinery space there is an airlock with two self-closing doors or a remotely operated watertight door is fitted, in appropriate technical condition 	
9	<p>Water fire main (SOLAS-74 Reg. II-2/4)</p> <p>Check by hammering under working pressure while paying particular attention to:</p> <ul style="list-style-type: none"> areas of possible formation of condensate in the main; areas exposed and liable to corrosion (lower parts of pipes, intersections with ship structures, flanged connections); pipes areas in way of waterline. 	

Continued

Nos	Item of technical supervision	Notes
10	<p>Ascertain that valves isolating water fire main from general service systems are in operating condition</p> <p>Fire hydrants, hoses and nozzles (SOLAS-74 Reg. II-2/4)</p> <p>Overall examination of fire receptacles on deck, in accommodation and other spaces, in engine room.</p> <p>Fire hydrants:</p> <p>ascertain that fire hoses fit hydrants (possibility of coupling), and that valve drives are readily operable manually.</p> <p>Fire hoses and receptacles:</p> <p>fire receptacles are in fit condition: they are free from penetration corrosion, covers are capable of being secured in place, drains are not clogged, there are no extraneous objects;</p> <p>all fire hoses are in place and in fit technical condition. The fire hoses have appropriate marking demonstrating performance of test within specified time limits, the requisite certificates of conformity and test reports are available;</p> <p>the number of fire hoses is as per fire plans and Record of Approved Ship Safety Equipment (Form 4.1.2);</p> <p>hose couplings rubber rings are in appropriate condition.</p> <p>Fire nozzles:</p> <p>the number of fire nozzles is the same as the number of hoses;</p> <p>all fire nozzles are in proper technical condition.</p> <p>Fire nozzles are interchangeable.</p> <p>All fire nozzles are of spray/jet type and incorporate a shutoff</p>	
11	<p>Portable fire extinguishers: foam, carbon dioxide, dry power (SOLAS-74 Reg. II-2/6)</p> <p>Check that the type, number and arrangement of fire extinguishers are in accordance with the fire plan and Record of Approved Ship Safety Equipment (Form 4.1.2).</p> <p>Ascertain that fire extinguishers casings are in appropriate technical condition and does not have corrosion spots.</p> <p>Check date of next servicing of fire extinguishers (recharging, weighing);</p> <p>Check that fire extinguishers are capable of being identified, and date of servicing verified (appropriate marking and labels are in place)</p>	<p>Date of next servicing of fire extinguishers:</p> <p>foam —</p> <p>carbon dioxide —</p> <p>dry powder —</p>
12	<p>Fire doors, escape routes (SOLAS-74, Reg. II-2/11; 47)</p> <p>Overall examination of accommodation spaces, control stations, corridors, engine room, while paying particular attention to fire doors and escape routes.</p> <p>Fire doors:</p> <p>check that the doors are capable of being operated and closed, ascertain that they are free from obstruction;</p> <p>ascertain that there are no hold-back arrangements on self-closing doors.</p> <p>Check that doors are capable of being closed using remote controls.</p> <p>Skylights and ventilation.</p> <p>Check packing in covers, including possibility of remotely controlled or automatic (if fitted) closing.</p> <p>Escape routes.</p> <p>Ascertain that escape routes are free from obstruction, and ladder stairs and railings are in fit condition</p>	<p>Skylights shall be of steel and shall not contain glass panels</p>
13	<p>Fire detection alarm, fire detectors (SOLAS-74 Reg. II-2/12; 13)</p> <p>Check operability of sprinkler system (if fitted).</p> <p>Check operability of fire detection station on bridge and/or in main fire control station</p>	
14	<p>International shore connection (SOLAS-74 Reg. II-2/19)</p> <p>Check availability on board of connection flange and its conformity to the sizes stipulated in SOLAS 74, and its completeness</p>	<p>Outside diameter 178 mm, inner diameter 64 mm. Flange thickness 14,5 mm, four bolts M16 × 50</p>
15	<p>Fire-fighter's outfit (SOLAS-74 Reg. II-2/17)</p> <p>Ascertain that the following is available:</p> <p>two fire-fighter's outfits on cargo ships;</p> <p>four fire-fighter's outfits on tankers.</p> <p>Check that required number of fire-fighter's outfits is available on passenger ships.</p> <p>Ascertain that the suits are being stored in separate places located at a distance from one another, as indicated on the fire plan.</p>	

Continued

Nos	Item of technical supervision	Notes
16	<p>Check completeness and technical condition of suits, footwear, gloves, helmets, belts, torches, fireproof lifelines.</p> <p>Check availability and completeness of breathing apparatuses.</p> <p>Check availability on board of required spare charges to breathing apparatuses and availability of air in air cylinders.</p> <p>Ascertain that the fireproof lifeline is of sufficient length and is fastened to the safety belt or self-contained breathing apparatus with a snap hook</p> <p>Fixed fire-extinguishing systems for cargo spaces and machinery and boiler spaces (SOLAS-74 Reg. II-2/7; 53)</p> <p>Check operability of smothering systems.</p> <p>Check equipment of fire extinction station:</p> <p>availability, arrangement, marking, absence of extraneous objects inside station;</p> <p>ascertain that there are operating instructions for the system;</p> <p>ascertain that gas cylinders are adequately secured;</p> <p>carry out visual examination of cylinders for corrosion;</p> <p>check latest survey reports for cylinders, tanks for availability and quality of extinguishing medium, documents for foam concentrate (availability of appropriate analysis: once in the first three years after manufacture, and thereafter, every year);</p> <p>check date when last inspection of system pipelines was performed by ship management;</p> <p>clarify next date of cylinders hydraulic tests;</p> <p>examine pipelines system at accessible areas to ascertain that they are free from corrosion;</p> <p>check activation of alarms giving audible warning of gas release;</p> <p>check telephone or other type of communication between engine and boiler room and main fire control station;</p> <p>check availability of box with key near the door leading to the station space;</p> <p>check condition of exhaust ventilation;</p> <p>check availability of protected spaces pipelines scheme</p>	
17	<p>Fire-extinguishing system in paint locker (SOLAS-74 Reg. II-2/18.7)</p> <p>Check that the entire fire-extinguishing system is in condition complying with applicable requirements</p>	The system shall be approved by the Flag State Administration (for ships flying the flag of RF, by the Register)
18	<p>Inert gas system in tankers (SOLAS-74 Reg. II-2/62)</p> <p>Check inert gas system.</p> <p>Ascertain that the inert gas system is in condition complying with applicable requirements and is functioning adequately.</p> <p>Check activation of alarm signal on control panel</p>	

International Maritime Organization

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28. GUIDELINES FOR SAFE OCEAN TOWING

1. The Maritime Safety Committee, at its seventieth session (7 to 11 December 1998), considered Guidelines for safe ocean towing, as prepared by the Sub-Committee on Ship Design and Equipment (DE) at its forty-first session (9 to 13 March 1998) and, in order to enhance safety of navigation and environmental protection, agreed to the need for such Guidelines for commercial towing operations which, by their nature, are not salvage or rescue towing services.

2. Recalling the adoption by the eighteenth session of the Assembly of resolution A.765(18) on Guidelines on the safety of towed ships and other floating objects, including installations, structures and platforms at sea and the availability of guidance to minimize the danger to navigation from towed objects, which have broken adrift from the towing vessel, have grounded or are out of control, the Committee approved the Guidelines for safe ocean towing, as set out in the annex.

3. Member Governments are invited to implement the annexed Guidelines and bring them to the attention of all parties concerned with ocean towing operations.

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- 1** Purpose
- 2** Application
- 3** Definitions
- 4** Responsibilities
- 5** Manning of towing vessels and towed objects
- 6** Planning
- 7** Preparation
- 8** Survey
- 9** Design environmental conditions
- 10** Weather forecast
- 11** Towing vessel requirements
- 12** Towing equipment
- 13** Towed object
- 14** In an emergency
- Appendix 1: Bollard pull testing procedure
- Appendix 2: Towing log

1 PURPOSE

1.1 The objectives of these Guidelines are to ensure safety at sea, prevention of human injury or loss of life, avoidance of damage to the environment, in particular to the marine environment, and to property through providing minimum recommendations for the organization, planning and execution of ocean towages and the design of associated equipment.

2 APPLICATION

2.1 These Guidelines are applicable to international ocean towing operations from one State to another State. However, these Guidelines may also be used for any other ocean towing operation.

2.2 These Guidelines do only apply to commercial towage operations, which are not in the nature of salvage. However, amongst towing vessels available to undertake such towing, priority shall be given to those which are fitted to the nearest extent in line with Section 12.

3 DEFINITIONS

Towing equipment is all towing equipment on the towing vessel and the towed object used to effect the towage.

Tow is the towing vessel, including towing vessel equipment and the towed object including its towing equipment, cargo and cargo securing.

Towage is the complete towing operation.

Towing master is the manager responsible for the towage. A tug master may be designated as towing master

Tug master is the master of a towing vessel.

1 and 10-year return periods are the most unfavourable combination of extreme environmental conditions, comprising wind, wave and current, that can be expected statistically every 1 and 10 years respectively.

Ocean towing is towing operations where the distance between designated ports of refuge or safe anchoring along the route is more than 24 h, taken into account weather conditions.

Breaking Load (BL) is documented minimum breaking load.

Bollard Pull (BP) is documented continuous bollard pull.

4 RESPONSIBILITIES

4.1 Organizational command lines shall be established and responsibilities and duties clearly defined before a towage commences.

4.2 The towing operation shall be in charge of a competent towing master, normally being either the master of the towing vessel or the master of the leading towing vessel, in case the towed object is towed by more than one towing vessel.

4.3 The towing master is responsible for the towing operation. In preparation for the towing operation, the towing master shall consider these guidelines, as appropriate. The towing master shall also consider what regulations are applicable during the towage, as well as ensuring that all relevant safety measures as he finds necessary are implemented.

4.4 Nothing in this section shall set aside or limit the towing master's/tug master's authority in accordance with maritime laws.

5 MANNING OF TOWING VESSELS AND TOWED OBJECTS

5.1 Towing vessels shall be manned to operate the towing vessel on a 24-hour basis in accordance with the STCW Convention.

5.2 The manning shall also, in addition to operating the vessel, be sufficient to ensure that it will be possible to:

establish a new towing connection; and board the unmanned towed object, if planned, in an emergency situation.

5.3 If the towed object is manned, the number of personnel on board the towed object shall, as far as possible, be limited to the necessary crew only.

5.4 Considerations shall be given to the need to safely transfer personnel and equipment between the towing vessel and the towed object when such operation is planned to take place in an emergency situation.

Personnel under transfer shall have life jackets or immersion suits, carry suitable radiocommunication equipment and portable lights. In selecting immersion suits, due regard shall be given to the degree of body heat-loss protection necessary in the area of operation.

6 PLANNING

6.1 All aspects of the towage shall be planned in advance, taking into account such factors as maximum anticipated environmental conditions as reflected in section 9.1, including tidal streams, current and water depths, as well as the size, windage, displacement and draft of the tow. Possible cargo and cargo securing arrangements on board the towed object shall also be taken into consideration. Strength calculation of non-routine cargo securing arrangements shall be carried out. Weather routing advice shall be obtained and used where available and appropriate, and careful consideration given to the bollard pull of the towing vessel(s) to be employed, cf section 9.4. The towing arrangements and procedures shall be such as to reduce to a minimum any danger to personnel during the towing operations.

6.2 There shall be a contingency plan on board the towing vessel to cover the onset of adverse weather, particularly in respect of arrangements for heaving to or taking shelter. Personnel shall be familiarized with their responsibilities and duties in an emergency situation in accordance with this contingency plan. If the towed object is manned, the contingency plan shall also be carried on such object.

6.3 There shall be operation or towing manuals on board the towing vessel which describe routine towing operations and additional manuals to describe any special towage requirements, of which due account shall be taken.

7 PREPARATION

7.1 The tow shall not proceed to sea until a satisfactory inspection of the tow has been carried out by the towing master and, if requested or for any reason considered necessary, by any other competent person.

7.2 The towing operation shall not commence unless the environmental conditions prevailing, and forecast, will allow the tow to achieve safe sea room where the tow is not endangered by a lee shore or other navigational hazards.

7.3 Where operational limitations have been identified for the tow, procedures shall be put in place to prevent the tow encountering conditions in excess of the limitations. Such procedures may include weather routing or safe shelter locations, or both.

8 SURVEY

8.1 In cases, where particular circumstances or factors signify an increased risk to the tow, or where the risk cannot be evaluated on the basis of seafaring and nautical knowledge and experience alone, the owner of the towing vessel, owner(s) of the towed object or the towing master/tug master shall apply for survey in accordance with these guidelines by a competent organization or authority, as appropriate.

9 DESIGN ENVIRONMENTAL CONDITIONS

9.1 The towed object, including cargo and securing arrangements, shall be capable to withstand the loads caused by the most adverse environmental conditions expected for the season and areas in question¹.

9.2 The duration of a towing operation is measured from the time the operation is started until the tow is in a safe condition at its arrival location. If there are locations along the route where the towed object can safely be located, the duration of the towing operation can be measured between such locations.

9.3 For long duration towing operations passing through areas having different sea state characteristics, the worst sea state for the route shall be considered when selecting the cargo securing arrangements and the equipment to ensure watertight integrity of the towed object.

9.4 The continuous bollard pull of the towing vessel(s) involved shall be sufficient to maintain station keeping of the tow in the following environmental conditions, acting in the same direction¹:

wind	20 m/s;
significant wave height	5 m;
current	0,5 m/s.

Other criteria may be acceptable if high confidence on the weather forecasts and experience data for the actual waters can be obtained.

10 WEATHER FORECAST

10.1 Where possible a weather forecasting source shall be available on a 24-h basis for the whole towing operation.

10.2 Weather forecasts shall, as a minimum, contain the following information:

synopsis of the area;
wind speed and direction;
wave height and period;
swell height and period;
outlook for the next 48 h.

10.3 In certain high risk situations, or when such forecast may be seasonally unpredictable, consideration shall be given to obtaining a second weather forecast.

10.4 Weather forecasts shall be received on the towing vessel (and received or relayed on the towed object if manned) at least every 24 h during the towage. Where there are specific weather limitations imposed, then more frequent forecasts may be appropriate, and possible direct communication with the forecaster if significant changes are expected.

¹ If found appropriate, the following guidance for design environmental conditions shall apply:

Duration of towing operation	Return period
≤ 5 days	1 year
> 5 days	10 year

11 TOWING VESSEL REQUIREMENTS

11.1 Towing vessels shall carry on board appropriate valid cargo ships certificates according to their size.

The following documents shall also be provided:

documentation of bollard pull;

documentation of all towing vessel equipment (refer to Section 12);

11.2 The continuous bollard pull (BP) at maximum continuous rated power of the main propulsion machinery shall be documented. The testing procedure in Appendix 1 or a similar procedure shall be adhered to.

11.3 When selecting towing vessels for long distance towing operations, special considerations shall be given to the following:

the vessels propulsion and steering gear are appropriate for the proposed towage operation;

the towline shall not hamper the vessel's manoeuvrability under extreme environmental conditions; and

the towing gear can be handled safely and effectively.

11.4 Towing vessels shall have an adequate reserve of fuel depending on the duration of the towing operation. If refuelling on route is necessary, suitable arrangements shall be provided before towing commences.

11.5 Towing vessels shall keep a towing log with information according to Appendix 2. Further, it shall keep an engine log for main propulsion machinery and auxiliaries required for the towage, which as a minimum shall contain information related to running hours and unscheduled events.

11.6 Towing vessels shall have a documented maintenance system for all important systems including communication and navigation equipment, main and auxiliary machinery, and steering and towing gear.

11.7 Notwithstanding the above requirements, all towing vessels, irrespective of their size, shall have as a minimum:

.1 marine radar in compliance with relevant recognized performance standards appropriate for the size and operation of the vessel;

.2 adequate self-sufficient fire suppression capability;

.3 installation of the following equipment:

.3.1 a searchlight that can be directed from the vessel's main steering station;

.3.2 two VHF-FM radios with Digital Selective Calling capability if not already equipped with Global Maritime Distress Safety System (GMDSS);

.3.3 an illuminated card type magnetic steering compass or an illuminated flux gate magnetic compass (with a reserve power supply) that can be read at the vessel's main steering station;

.3.4 an echo depth-sounding device that can be read at the vessel's main steering station; and

.3.5 an electronic positioning device; and

.4 the following on board:

.4.1 currently corrected marine charts of the area to be transited, published by an appropriate authority, of a scale large enough to make navigation of the area possible; and

.4.2 any other useful currently corrected navigational publications and notices.

12 TOWING EQUIPMENT

12.1 The towing equipment shall be designed according to the below mentioned recommendations and recognized standards. The towing arrangements shall be suitable for the particular tow and of adequate strength.

12.2 The towing vessel shall be equipped with a towing winch.

12.3 It is recommended that the towing winch brakes shall have an appropriate static holding capacity to that of the documented minimum breaking load (MBL) of the largest towline to be used. The holding capability shall be calculated for the outermost towline layer on the winch drum at which towing will be performed.

12.4 The design and scantling of the towing winch, including supports, shall be capable of withstanding the breaking load of the main towing wire rope without permanent deformation.

12.5 It shall be possible to release the tension on the winch drum(s) in an emergency and in all operational modes. The end attachment of the towing wire rope to the winch drum shall be of limited strength, thus forming a weak link in case the towline has to be run out. After an emergency release the winch brakes shall revert to normal function without delay. It shall also be possible to carry out the emergency release sequence (emergency release/application of brakes) even during a black-out.

12.6 It is recommended that on board towing vessels, whenever practicable, the winch shall be fitted with equipment for measuring the tension in the towline. This equipment shall, as a minimum, record the mean tension and the tension peaks, and the information shall be displayed in the wheel house.

12.7 Means shall be provided to spool the towline effectively on the drum(s).

12.8 Towline protection sleeves, or other means shall be provided to prevent the toelines being damaged by chafing or abrasion. There shall be no sharp edges or obstructions at the stern of the vessel that may damage the towlines during operation. A sufficient number of spare towline sleeves shall be carried on board.

12.9 An appropriate length for the towline shall be determined using established criteria. Where no such criteria has been established, the minimum required length (L) of the main towline shall be determined from the formula

$$L = (BP/BL) \times 1800 \text{ m}$$

where BL = documented breaking load of the towline;
 BP = continuous bollard pull.

12.10 All wire ropes in use shall have the same lay (i.e. right hand, left hand, etc.).

12.11 The minimum documented breaking load (MBL) of the main towline shall generally be in accordance with the following table:

BP , t	< 40	40 — 90	> 90
MBL , t	$3,0 \times BP$	$(3,8 - BP/50)BP$	$2,0 \times BP$

12.12 A spare towline satisfying all requirements for the main towline shall be kept on board the towing vessel.

If the towing winch is equipped with two drums the spare towline shall preferably be stored on the winch drum, readily available for use.

The alternative is to have a spare towline which shall be in position and so arranged to ensure that transfer to the main towing drum is easily, quickly and safely effected.

In case of two towed objects whereby two independent towlines (main and spare) are to be connected, an extra spare towline shall be on board, arranged as specified above.

12.13 All wire rope terminations shall be hard eyes, i.e. reinforced thimbles or spelter sockets except for the end connection to the drum on the towing winch.

12.14 All connecting items like shackles, rings, etc., shall have an ultimate load bearing capacity of minimum 50 per cent in excess of the documented minimum breaking load (MBL) of the towing arrangement to be used.

12.15 If fibre rope pennants are used, the pennants shall be in a sound condition and the minimum breaking load of any fibre rope pennants shall not be less than:

2,0 times the tow line MBL, for tugs with bollard pull less than 50 t;
1,5 times the tow line MBL, for tugs with bollard pull greater than 100 t; and
linearly interpolated between 1,5 and 2,0 times the tow line MBL for tugs with bollard pull between 50 and 100 t.

Fibre rope pennants shall be of grommet construction and be terminated with hard eyes, and shall not normally be connected directly to the apex of the towing bridle,

12.16 The towing vessel shall be equipped with sufficient spare equipment to completely replicate the towing arrangements, unless found impractical.

12.17 Inspection of the towline shall be carried out on completion of each towing operation. The results of the inspection shall always be recorded as a basis for decision on future inspection programs. The inspection shall also be noted on the towing log (refer to Appendix 2).

12.18 No part of any towline arrangement shall be used for the towing operation if:
the reduction in cross sectional area due to wear, abrasion, corrosion and broken wires exceeds 10 per cent or there is severe kinking, crushing or other damage resulting in distortion of the rope structure;
end sockets or other towline terminations such as thimbles, etc., are damaged, deformed or significantly corroded.

12.19 If relevant, gog ropes or alternative arrangement shall be provided to prevent athwartship pull, and to facilitate retrieving of the towline. The arrangement shall be remotely operated from a safe position. A spare gog rope shall be carried on board.

13 TOWED OBJECT

13.1 Every towed object, whether manned or not, shall be assessed and provided with a confirmation of its readiness to be towed, covering all below mentioned requirements.

13.2 The towed object shall have adequate intact stability in all the loaded and ballast conditions expected during the voyage. Compliance with any applicable damage stability criteria shall be verified, if not unreasonable due to special conditions. Such damage stability shall be demonstrated to the extent the towed object may have been previously documented to.

13.3 Prior to sailing, the watertight and weathertight integrity shall be confirmed by an inspection of the closing arrangements for all hatches, valves, airpipes, and other openings through which water might enter the towed object and affect its stability. It shall also be confirmed that any watertight doors or other closing arrangements within the hull are securely closed and that any portable closing plates are in place.

13.4 Towed objects shall be at a suitable draught and suitably trimmed for the intended voyage, commensurate with the stability condition demonstrated in accordance with 13.2.

13.5 It shall be documented that the towed object has adequate structural integrity in relation to the cargo loads, the design environmental conditions and other foreseen loads during the voyage. Where applicable, reference shall be made to the towed object's loading manual.

13.6 The cargo securing arrangements (refer to 6.1) and weather protection for the cargo, equipment and stores carried on the towed object shall be carefully examined to ensure that they are adequate for the voyage. Where applicable, reference shall be made to the towed object's cargo securing manual.

13.7 Where applicable, a bridle shall normally be used for connection of the main towing wire rope to the towed object. Chains shall be used in way of chafing areas such as fairleads.

13.8 All connection parts (e.g. each leg of a bridle) shall have a documented minimum breaking load (MBL) exceeding the breaking load of the towing arrangement.

13.9 Towline attachments shall be designed to resist the towline pull from any likely direction, with use of fairleads if necessary. The design and arrangement of the towing fittings shall take into account both normal and emergency conditions.

13.10 The ultimate strength of any towline attachment (bracket or bollard and their foundation) shall not be less than 1,3 times the minimum breaking load of the towing arrangement which is to be attached.

13.11 Fairleads shall be designed to accommodate the chafing chain and shall be shaped so as to prevent excessive bending stress in the chain links.

13.12 A bridle recovery system shall be fitted on the towed object, strong enough to be utilised after towline breakage, in case the bridle is planned to be used again during the towage.

13.13 Emergency towing equipment shall be provided in case of bridle failure or inability to recover the bridle. This equipment shall preferably be fitted at the bow of the towed object and shall consist of a spare bridle or towing pennant fitted with a floating rope and buoy allowing it to be picked up without any significant hazard.

13.14 Towed objects shall exhibit the navigation lights, shapes and, if manned, make the sound signals required by the International Regulations for Preventing Collisions at Sea, 1972, as amended. Due consideration shall be given to the reliability of the lights and sound signals and their ability to function for the duration of the voyage. When practicable, a duplicate system of lights shall be provided.

13.15 Boarding facilities shall be rigged on each side of the towed object.

13.16 When appropriate, the rudder shall be secured in the amidships position and measures taken to prevent the propeller shaft from turning.

13.17 Life-saving appliances in the form of lifejackets and life buoys shall be provided whenever personnel are likely to be on board the towed object even if only for short periods. When personnel are expected to remain on board for longer periods of time, liferafts shall also be provided. If the freeboard is more than 4,5 m, liferaft davits shall be provided, unless rendered impractical due to the design or conditions of the towed object.

Whenever the towed object is continually manned, the riding-crew shall be provided with adequate supplies of food and water, cooking and sanitary facilities, radio equipment, including means of communication with the towing vessel, distress signals, life-saving and fire-fighting appliances.

13.18 Towed objects shall be equipped with an anchor, suitable for holding the towed object in severe weather conditions, that is securely attached to a chain cable or wire and is arranged for release in an emergency by persons on, or boarding the towed object, unless rendered impractical due to the design or conditions of the towed object.

13.19 To reduce the risk of pollution, the amount of oil carried on the towed object shall be limited to what is required for the safety of the towed object and/or towing vessel and for their normal operations, provided no risk to the environment will result from the removal of oil from the towed object.

14 IN AN EMERGENCY

14.1 Shall the tow present a direct danger to navigation, offshore structures or coastlines through breaking adrift or for some other cause, the master of the towing vessel is bound by SOLAS regulation V/2 to communicate the information by all the means at his disposal to ships in the vicinity, and also to the competent authorities at the first point on the coast with which he can communicate.

14.2 In all cases, the arrangements for recovering the tow, shall it break adrift, shall be made in accordance with good seamanship, bearing in mind the seasonal weather conditions and area of operation.

BOLLARD PULL TESTING PROCEDURE

1. A proposed test programme shall be submitted prior to the testing.
2. During testing of continuous bollard pull (BP) the main engine(s) shall be run at the manufacturer's recommended maximum torque according to maximum continuous rating. Verification of the actual output shall be requested during the test.
3. During testing of overload pull, the main engine(s) shall be run at the manufacturer's recommended maximum rating that can be maintained for minimum 30 minutes. The overload test may be omitted.
4. The propeller(s) fitted when performing the test shall be the propeller(s) used when the vessel is in normal operation.
5. All auxiliary equipment such as pumps, generators and other equipment which are driven from the main engine(s) or propeller shaft(s) in normal operation of the vessel shall be connected during the test.
6. The length of the towline shall not be less than 300 metres, measured between the stern of the vessel and the test bollard. A minimum length of twice the vessel length might be accepted.
7. The water depth at the test location shall not be less than 20 m within a radius of 100 m of the vessel. If the water depth of 20 m cannot be obtained at the test location, then a minimum water depth which is equal to twice the maximum draft of the vessel may be accepted. It shall be noted that reduced water depth may adversely affect the test results.
8. The test shall be carried out with the vessel's displacement corresponding to full ballast and half fuel capacity.
9. The vessel shall be trimmed at even keel or at a trim by stern not exceeding 2 per cent of the vessel's length.
10. The vessel shall be able to maintain a fixed course for not less than 10 min while pulling as specified in items 2 or 3 above. Certified continuous bollard pull is the average reading of the 10 min period.
11. The test shall be performed with a wind speed not exceeding 5 m/sec.
12. The current at the test location shall not exceed 0,5 m/s in any direction.
13. The load cell used for the test shall be approved by a competent body and be accurate within ± 2 per cent within the range of loads to be measured and for the environmental conditions experienced during the test.
14. An instrument giving a continuous read-out and also a recording instrument recording the bollard pull graphically as a function of time shall both be connected to the load cell. The instruments shall if possible be placed and monitored ashore.
15. The load cell shall be fitted between the eye of the towline and the bollard.
16. The figure certified as the vessel's continuous bollard pull shall be the towing force recorded as being maintained without any tendency to decline for a duration of not less than 10 minutes.
17. Certification of bollard pull figures recorded when running the engine(s) at overload, reduced RPM or with a reduced number of main engines or propellers operating can be given and noted on the certificate.
18. A communication system shall be established between the vessel and the person(s) monitoring the load cell and the recording instrument ashore, by means of VHF or telephone connection, for the duration of the test.

TOWING LOG

Vessel: Date/Master sign: Insp. Date/Year:
 Main Towline: (Installed) Breaking Load:¹ (M/T) Length/Dia: Insp. Date/Year:
 Spare Towline: Breaking Strain:¹ (M/T) Length/Dia: Insp. Date/Year:
 Main Towline: Lubrication (L) Maintenance (M) Date: Ref Insp Reports etc.:
 Spare Towline: Lubrication (L) Maintenance (M) Date: Ref Insp Reports etc.:
 Towed Object: Towline Connected: Date/Hours Position:
 Length of Bridle (M): Towline Released: Date/Hours Position:

TOWING INFORMATION (NOON + MIDNIGHT OR TWICE A DAY)							Remarks	
FROM	TO	Duration of wire rope used (total days/hours)	Wire tension (M/T)	Wire length (m)	ENVIRONMENTAL CONDITIONS	Wire length Adjusted + - (m)		
Date/year	Hours	Date/year	Hours	Max.	Aver.	Wave (height/direct./period)	Wind (force/direct.)	
Total to be transferred to page				Remarks:				

¹ For the main towline.

29. VESSEL'S RECORDS (PR1A) ¹

Name of ship

IMO No.

Losing Society

1. *Damages by events
2. *Major repairs
3. *Conversion of hull-dates
4. *Major alterations of machinery installation-dates
5. Condition evaluation / hull summary report if applicable
6. *History of recommendations / conditions of class
7. Thickness measurements from the last special survey and subsequent thickness measurements, including areas with substantial corrosion
8. Report of the last special survey and subsequent periodical reports
9. *Information on coating condition of water ballast tanks (including non ESP ships)
10. Restrictions / limitations On navigation area
11. Optional photos when available

Note . * As retained by the Losing Society.

¹May be drawn in electronic format or in hard copy.

30. EXAMINATION AND OPERATIONAL TEST OF MEANS OF EMBARKATION AND DISEMBARKATION DURING SURVEYS OF CARGO AND PASSENGER SHIPS

1 ACCOMMODATION LADDERS/GANGWAYS AND DAVITS

1.1 Accommodation ladder

1.1.1 The following items shall be thoroughly examined during annual surveys required for satisfactory condition of the accommodation ladder:

- .1** steps;
- .2** platforms;
- .3** all support points such as pivots, rollers, etc.;
- .4** all suspension points such as lugs, brackets, etc.;
- .5** stanchions, rigid handrails, hand ropes and turntables;
- .6** davit structure, wire and sheaves, etc.

1.1.2 At every five-yearly survey, upon completion of the examination required by 1.1.1 the gangway shall be operationally tested with the specified maximum operational load of the gangway.

1.2 Gangway

1.2.1 The following items shall be thoroughly examined during annual surveys and checked for satisfactory condition of the gangway:

- .1** treads;
- .2** side stringers, cross-members, decking, deck plates, etc.;
- .3** all support points such as wheel, roller, etc.;
- .4** stanchions, rigid handrails, hand ropes; and etc.

1.2.2 At every five-yearly survey, upon completion of the examination required by 1.1.1 the gangway shall be operationally tested with the specified maximum operational load of the gangway.

2 WINCH

2.1 During annual surveys the following items shall be examined for their satisfactory condition:

- .1** brake mechanism including condition of brake pads and band brake, if fitted;
- .2** remote control system; and
- .3** power supply system (motor).

2.2 At every five-yearly survey, upon completion of the examination required by 2.1, the winch shall be operationally tested with the specified maximum operational load of the accommodation ladder.

3 TESTS

3.1 The tests specified in 1 and 2 are for the purpose of confirming the proper operation of the accommodation ladder, gangway and/or winch, as appropriate.

3.2 The load used for the test shall be:

- .1** the design load; or
- .2** the maximum operational load, if this is less than the design load and marked as accommodation ladders and gangways; or
- .3** the load nominated by the shipowner or operator only in those cases where the design load or maximum operational load is not known (e.g., for accommodation ladders or gangways which are

provided on board ships constructed prior to 1 January 2010), in which case that nominated load shall be used as the maximum operational load.

3.3 The tests shall be carried out with the load applied as uniformly as possible along the length of the accommodation ladder or gangway, at an angle of inclination corresponding to the maximum bending moment on the accommodation ladder or gangway.

3.4 Following satisfactory completion of the applicable test(s) without permanent deformation or damage to the tested item, the load used for that test shall be marked as the maximum operational load in accordance with 3.5 of MSC.1/Circ.1331.

3.5 Marking.

Each accommodation ladder or gangway should be clearly marked at each end with a plate showing the restrictions on the safe operation and loading, including the maximum and minimum permitted design angles of inclination, design load, maximum load on bottom end plate, etc.

Where the maximum operational load is less than the design operational load, it should also be shown on the marking plate.

4 FITTINGS AND DAVITS

During annual surveys all fittings and davits on the ship's deck associated with accommodation ladders and gangways shall be examined for satisfactory condition

5 MEANS OF ACCESS TO DECK

During annual surveys the fittings or structures for means of access to decks such as handholds in a gateway or bulwark ladder and stanchions shall be examined for satisfactory condition.

6 REQUIREMENTS FOR INSTALLATION

As far as practicable, the means of embarkation and disembarkation should be sited clear of the working area and should not be placed where cargo or other suspended loads may pass overhead.

7 ADDITIONAL INFORMATION FOR SURVEYORS

Tests of means of embarkation/disembarkation shall be performed by the shiprepair firm under RS surveyor supervision. Under the shipowner's request test could be done by the crew of the ship on the witness of RS surveyor in accordance with manufacturer's instruction, if any, or in accordance with program agreed by RS.

The program of testing shall be elaborated with taking in account of recommendations of the table.

Upon results of survey (annual, 5-year tests etc.) of means of embarkation/disembarkation RS surveyor shall fill out and issue Statement (Form 4.1.8) on board the ship.

Annual examinations of means of embarkation/disembarkation shall be done by the RS surveyor.

Applied Loads for new and existing Winches, Accommodation Ladders and Ship's Gangways in accordance with IACS recommendation No. 119 "Uniform application of SOLAS Reg. II-1/3-9 in association with MSC.1/Circ.1331"

Survey	Tests	Winch/Accommodation Ladder ¹ Arrangement	Gangway ²
Initial installation ³	Static Load Test (no permanent deformation permitted)	Apply load per 3.2 uniformly with winch suspending ladder in horizontal position	NA
	Operational tests	The winch should be tested as a part of the complete accommodation ladder unit through a minimum of two times hoisting and lowering of the accommodation ladder in accordance with the onboard test requirement specified in applicable international standards such as ISO 7364:1983. Apply this requirement with weight of ladder only (raise and lower ladder at least twice)	NA
Renewal survey (5-yearly) ^{3,4}	Static Load Test (no permanent deformation permitted)	Apply load per 3.2 ² uniformly with winch holding ladder in horizontal position	Apply 1.2.2 with Load per 3.2 ⁵ applied uniformly to gangway in horizontal position
	Operational Test	Raise and lower ladder once (weight of ladder only)	NA
Annual ⁴	No load testing to be carried out; only examination of components		

¹ Includes landing platforms if fitted.

² Only when carried onboard the ship.

³ ships Constructed on/after 1 January 2010 and equipment replaced on existing ships on/after 1 January 2010.

⁴ All installations, regardless of installation or ship construction date.

⁵ If MWL unknown for existing gangways/ladders, owner nominates load as per 3.2.

Refers to paras from IMO circular MSC.1/Circ.1331.

Notes: 1. Measurement of deflections is not required after testing. Instead, a visual inspection of ladders/gangways shall be carried out to ensure that there is no damage or permanent deformation after testing.

2. Where it is not possible to site the means of embarkation and disembarkation clear of the working area or locations where cargo or other suspended solids pass overhead, then subject to the Administration's agreement the posting of a warning notice such as "Entry is prohibited" would be acceptable as an exemption from para 3.1 of MSC.1/Circ.1331.

3. The tests as required in MSC.1/Circ.1331 paras 5.1.1.2 for accommodation ladders, 5.1.2.2 for gangways and 5.2.2 for winches shall be carried out with:

a static test by applying the test load in compliance with para 5.3.2; and

an operational test (raising and lowering) with only the weight of accommodation ladder and no additional test load; and

shall be completed at the time of the survey for endorsement/renewal of the passenger ship safety certificate or cargo ship safety equipment certificate, but not later than 01.01.2015, i.e. 5 years after 1 Jan 2010 for existing arrangements on existing ships and, thereafter, at intervals no more than 5 years measured from the completion of the first tests.

ANNEX 31

Annex 31 has been deleted. The Annex number has been reserved.

32. INSTRUCTIONS FOR THE PROCEDURE FOR TESTING OF ROPE LADDERS, KNOTTED LIFELINES, LIFE BELTS AND SAFETY ROPES¹

1 GENERAL

1.1 Testing of rope ladders, knotted lifelines, life belts and safety ropes are performed by shipping companies centrally on specialized test benches.

Safety arrangement shall have a label indicating the inventory and the date of the next testing.

It is prohibited to use arrangements on board the ship when the period since their testing exceeds 1 month.

It is allowed to perform tests of rope ladders and knotted lifelines up to 9 m in length, life belts and safety ropes in case the next testing date occurs during the ship's voyage.

Ship's officers shall withdraw them out of operation or perform special testing in case of any defects or doubts in the strength of arrangements.

1.2 Testing of arrangements on board the ships shall be carried out by a commission appointed by an order of the Master, chaired by a chief engineer. The commission shall include a public inspector on labor protection.

1.3 Chief engineer is responsible for timely testing of arrangements.

1.4 The commission shall perform visual inspection of the arrangements submitted for testing and after loading with the test load shall carefully examine the components of the arrangement under test.

1.5 Upon the results of testing the commission shall issue a Test Report where it specifies the possibility of further use of the arrangement in accordance with its purpose and indicates the date of next testing.

2 FREQUENCY OF TESTING AND NORMS OF LOADING

2.1 Rope ladder and knotted lifeline shall be tested annually.

2.2 Life belt and safety rope shall be tested once in 6 months.

2.3 Norm of the test load in newtons for the rope ladder and knotted lifeline shall be determined according to the formula $P_t = KL$, where P_t – testing load; K – coefficient taking into consideration the mass of an individual and a margin of testing load being equal to 1176; L – length of rope ladder (distance between its extreme steps) or lifeline, in m.

2.4 Norm of test load for life belt and safety rope is 4000N.

3 PROCEDURE AND TIME OF TESTING

3.1 Rope ladders.

3.1.1 Side ropes and steps of the rope ladders shall be tested separately.

3.1.2 Testing of side ropes.

3.1.2.1 To each side rope, a test load shall be applied equal to 50 per cent of the cargo calculated for the rope ladder as per the formula given in 2.3.

¹ The present Instructions are applicable only for ships flying the flag of the Russian Federation. For ships under other flags one should follow the guidelines of Maritime Administration of this flag State.

3.1.2.2 During the simultaneous testing of two side ropes to ensure their equal tension under the lower and upper steps the thrusts shall be installed to prevent convergence (closing) of side ropes and breakage of the steps after application of the load.

3.1.2.3 During the test, the suspended load shall be secured in the lower part of the rope ladder on the side rope, after that by means of a hoisting gear the rope ladder shall be stretched in such a way that the test load is to locate at the height not exceeding 100 mm from the surface of test area or deck.

3.1.2.4 Time of exposure of side rope under the load is 5 min.

3.1.2.5 After unloading, the side ropes shall be carefully examined. In case of break of the side rope strands, displacement of seizings and non-concurrency of the steps between each other the rope ladder shall be withdrawn from operation.

3.1.3 Testing of steps.

3.1.3.1 25 per cent of steps are selected for testing, first of all those steps appearance or technical condition of which raises doubts, and in the center of each selected step the load of 1176 N shall be secured in turn, then the rope ladder is to be lifted.

While testing the rope ladders at the shore test bench, the simultaneous hanging of the test load to all steps subjected to testing is allowed.

3.1.3.2 Each step shall be exposed to load during 5 min.

3.1.3.3 After removal of load the examination of the tested steps shall be carried out, and a label in respect of the tests of the rope ladder according to 1.1 shall be fixed to the stringer.

TEST Report of Arrangements

m/v _____ « ____ » _____ 200__

Commission consisting of _____
(position, surname of the chairman and members of the commission)

appointed by an order of the Master of the ship No. _____ of « ____ » _____ 20__ has performed testing of the arrangements listed below:

Name of arrangement	Inventory number of arrangement	Test load, in N	Test results	Date of the next test

Chairman of the commission _____
(signature)

Members of the commission _____
(signatures)

3.2 Knotted lifelines.

3.2.1 Test load calculated as per the formula given in 2.3 is fastened to the lower manrope of the knotted lifeline, after that, by means of cargo handling gear the lifeline is lifted by its upper rope so that the test load to be situated at the height not exceeding 100 mm above the level of test area or deck.

3.2.2 Each knotted lifeline shall be exposed to load during 5 min.

3.2.3 After removal of load, the examination of the lifeline shall be carried out. In case of break of the side rope strands the lifeline shall be withdrawn from operation.

3.2.4 To the upper end of the knotted lifeline, a label indicating the date of tests shall be fixed.

3.3 Life belts.

3.3.1 Testing of life belt without straps is performed by static load. Life belt without belts shall be put on a console 300 mm in diameter. Test load shall be hanged in turn on the sling (chain) safety latch, on the free semi-ring (eye) for fastening the safety latch or on the safety latch of another sling, depending on the design of the life belt.

3.3.2 Testing of the life belt with straps by static load is carried out on a dummy¹ fastened to the console. Test load shall be hanged in turn on the fastening ring of the safety rope, on the sling (chain) safety latch, on the free semi-ring (eye) for fastening the safety latch.

3.3.3 Each assembly of the life belt shall be exposed to load during 5 min.

3.3.4 Life belt is considered to be stood the test, when no residual deformation or other defects are detected (break of seams of girdle and belts, tears of the belts and girdle band, etc.). Lock of the safety latch shall correctly and tightly get in the safety latch notches.

In case such defects are detected the life belt shall be withdrawn from service.

3.3.5 Number of the belt and date of testing (month and year) shall be indicated on the life belt.

3.4 Safety rope.

3.4.1 Testing of the safety rope is performed by application of test load to its end. When testing is carried out at the vertical position of safety rope or a part of it, then a distance between the test area, berth or ship's deck and the lifting test load shall not exceed 100 mm.

3.4.2 Time of exposure under load is equal to 5 min.

3.4.3 After removal of load, the examination shall be carried out, and in case of break of the side rope strands the safety rope shall be withdrawn from operation.

3.4.4 Label with indication of the date of testing shall be attached to one of the ends of the safety rope.

3.4.5 It is permitted to perform testing of safety ropes by parts. During such testing, full load shall be applied to each section of the safety rope under test.

¹ In compliance with GOST 5718-77 "Life Belts. General Technical Conditions" a bag with sand having a mass of 85 kg is understood as a dummy.

33. GUIDELINES IN COMPLIANCE WITH THE POLAR CODE REQUIREMENTS AND REGULATION XIV/2.2 OF SOLAS-74, AS AMENDED (REFER TO IMO CIRCULAR MSC.1/CIRC.1562)

SURVEYS IN ACCORDANCE WITH THE POLAR CODE AND REGULATION XIV/2.2 OF SOLAS-74, AS AMENDED

1. Ships under Harmonized System of Survey and Certification (HSSC) Scheme			
Type of ship	Initial Survey for issuance of the Polar Ship Certificate.	Surveys for the maintenance of the Polar Ship Certificate RS issues the first Polar Ship Certificate	Surveys for renewal of the Polar Ship Certificate RS issues the first Polar Ship Certificate
Passenger Ship	First passenger ship's safety renewal survey after 1 January 2018.	Not applicable	Every year
Cargo ship	First Safety Construction intermediate survey or renewal survey, related to Cargo Ship Safety Construction Certificate as required by regulation I/10 of SOLAS-74 as amended, whichever occurs first after 1 January 2018. The validity period of the Polar Ship Certificate shall not exceed the validity period of the appropriate SOLAS-74 as amended certificate (Cargo Ship Safety Certificate or Cargo Ship Safety Construction Certificate).	a) Aligned with maintenance survey (annual or intermediate) related to the Cargo Ship Safety Certificate. The Polar Ship Certificate shall be endorsed upon satisfactory results of the maintenance survey related to the Polar Code and Cargo Ship Safety; or b) Aligned with maintenance survey (annual or intermediate) related to the Cargo Ship Safety Construction Certificate. The Polar Ship Certificate shall be endorsed upon satisfactory results of the maintenance survey (annual or intermediate) related to the Polar Code and SOLAS-74 as amended on the Cargo Ship Safety Construction, provided that valid Cargo Ship Safety Equipment and Cargo Ship Safety Radio Certificates are held by a ship.	a) Aligned with renewal survey related to the Cargo Ship Safety Certificate. The Polar Ship Certificate shall be reissued upon satisfactory results of the renewal survey related to the Polar Code and SOLAS-74 related to Cargo Ship Safety; or b) Aligned with renewal Survey for issuing of Cargo Ship Safety Construction Certificate. The Polar Ship Certificate shall be reissued upon satisfactory results of the renewal survey related to the Polar Code and SOLAS-74 as amended on the Cargo Ship Safety Construction, provided that Cargo Ship Safety Equipment and Cargo Ship Safety Radio Certificates are held by a ship.
2. Ships not under Harmonized System of Survey and Certification (HSSC) Scheme			
Type of ship	Initial Survey for issuance of the Polar Ship Certificate	Surveys for the maintenance of the Polar Ship Certificate RS issues the first Polar Ship Certificate	Surveys for renewal of the Polar Ship Certificate RS issues the first Polar Ship Certificate
Passenger Ship	First passenger ship's safety renewal survey after 1 January 2018.	Not applicable.	Every year.
Cargo ship	First Safety Construction renewal survey for issuing Cargo Ship Safety Construction Certificate as required by regulation I/10 of SOLAS-74 as amended, which occurs after 1 January 2018 but, in any case, not later than 31 March 2021. The validity period of the Certificate shall not exceed the validity period of the Cargo Ship Safety Construction Certificate.	Aligned with maintenance survey (annual or intermediate) related to the Cargo Ship Safety Construction Certificate. The Polar Ship Certificate shall be endorsed upon satisfactory results of maintenance survey (annual or intermediate) related to the Polar Code and SOLAS-74 as amended on the Cargo Ship Safety Construction, provided that valid Cargo Ship Safety Equipment and Cargo Ship Safety Radio Certificates are held by a ship.	Aligned with renewal Survey of Safety Construction. The Polar Ship Certificate shall be reissued upon satisfactory results of the renewal survey related to Polar Code and SOLAS-74 as amended on the Cargo Ship Safety Construction, provided that Cargo Ship Safety Equipment and Cargo Ship Safety Radio Certificates are held by a ship.

34. GUIDELINES FOR SURVEYORS TO THE REGISTER ON SURVEY OF BOW, SIDE, STERN DOORS AND AMPS AND INNER DOORS OF RO-RO SHIPS AND PASSENGER RO-RO SHIPS

The requirements for survey of ro-ro and passenger ro-ro ships are established in accordance with IACS UR Z24 and given in Section 17, Part III "Additional Surveys of Ships Depending on their Purpose and Hull Material" of the Rules for the Classification Surveys of Ships in Service. The present Annex is provided as a reference, which includes useful information for surveyors.

Terms, relating to the arrangements of bow, side, stern doors and ramps, ports and inner doors of ro-ro ships are specified in the document "Terms, applied in marine industry" placed in the internal RS web-site: [http://gur.rs-ead.spb.ru/win/onti/dictionary/Glossary-T1 .pdf](http://gur.rs-ead.spb.ru/win/onti/dictionary/Glossary-T1.pdf).

The requirements for arrangement and closing devices on ro-ro ships are given in Part III "Equipment, Arrangements and Outfit" of the Rules for the Classification and Construction of Sea-Going Ships.

The Manual on Operation and Repair of Doors in Shell Plating shall be developed in compliance with the requirements of 7.5.18, Part III "Equipment, Arrangements and Outfit" of the Rules for the Classification and Construction of Sea-Going Ships and then approved by the Register.

Arrangement of bow, side, stern and inner doors of ro-ro ships are shown in Figs. 1 to 49 below.

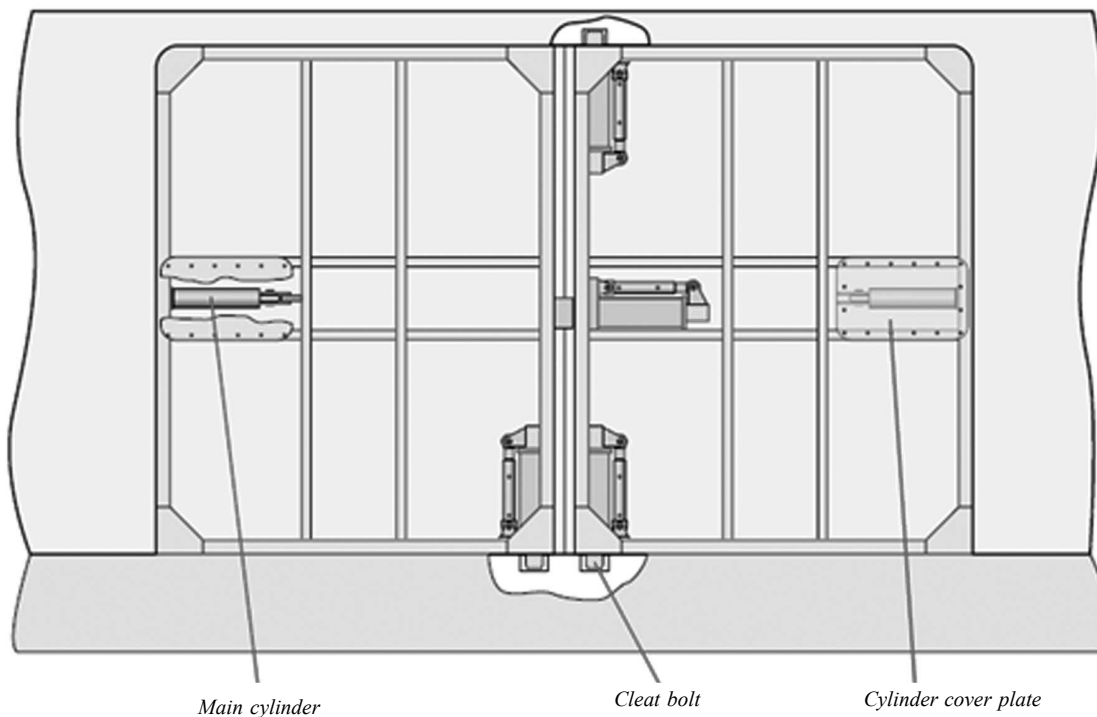


Fig. 1 Inner Bow Doors – double leaf side hinged

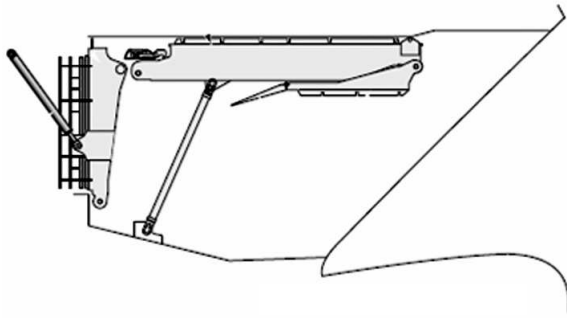


Fig. 2 Bow loading ramp – stowed position, aft part (inner door) disconnected

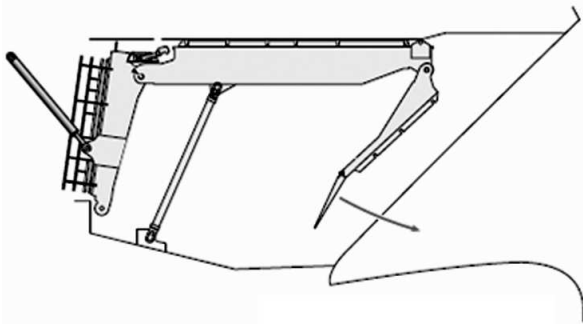


Fig. 3 Bow loading ramp – beginning of opening sequence, aft part (inner door) connected by hydraulic hinge pin

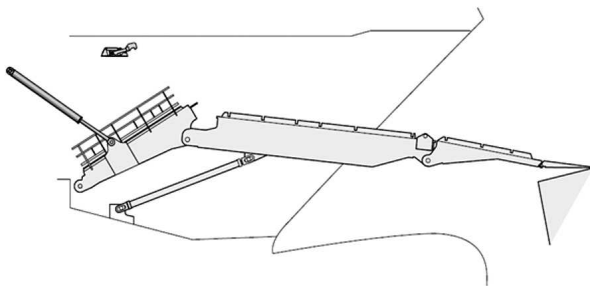


Fig. 4 Bow loading ramp – ramp partly extended to quay

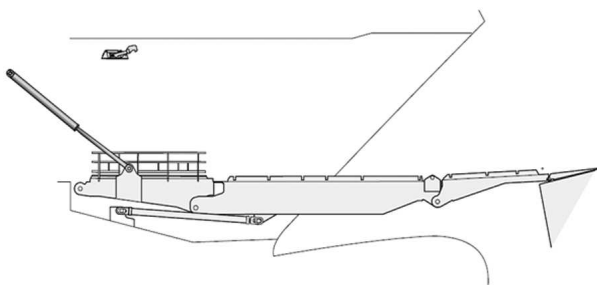


Fig. 5 Bow loading ramp – ramp fully extended to quay

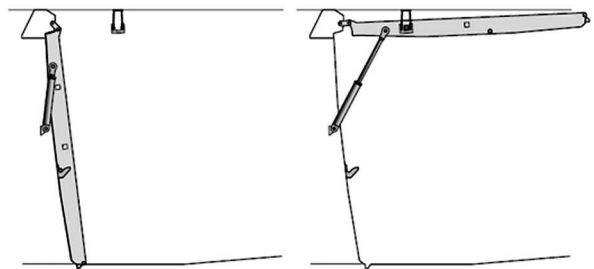
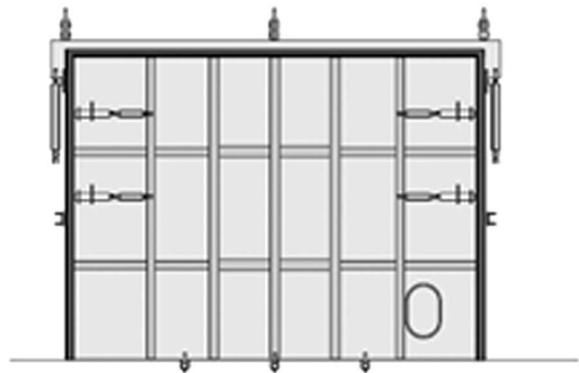


Fig. 6 Inner bow door – single leaf top hinged, type 1

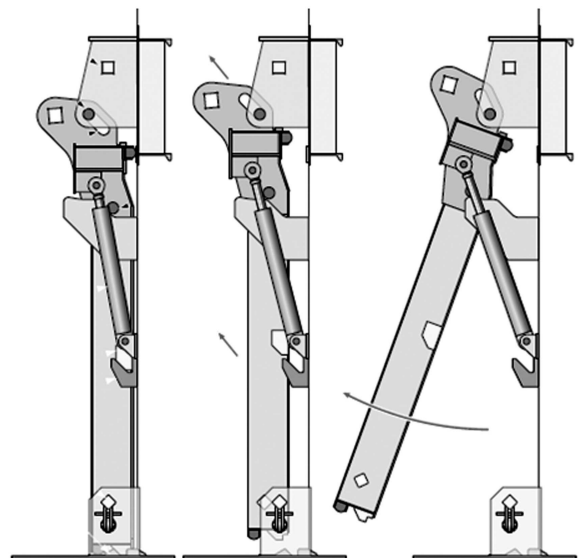


Fig. 7 Inner bow door – single leaf top hinged, type 2

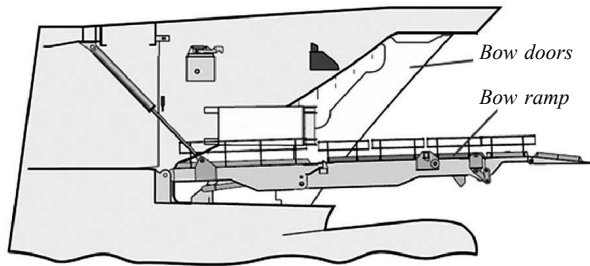


Fig. 8 Bow loading ramp – side opening bow doors

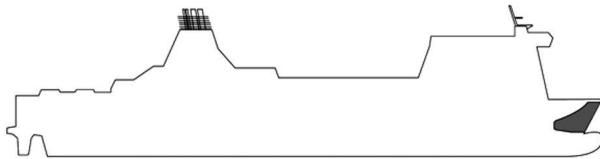


Fig. 9 Bow side opening door – closed, side view

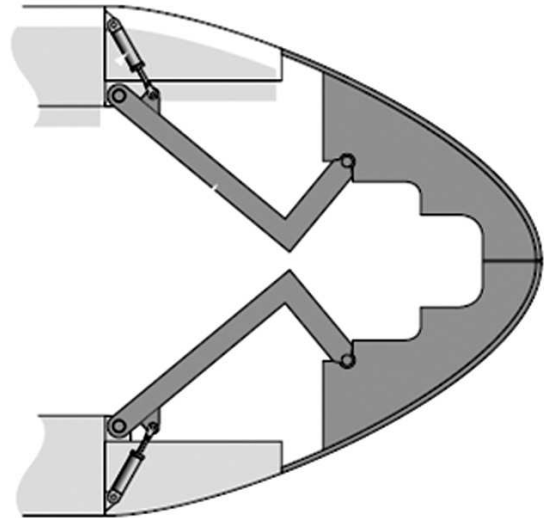


Fig. 10 Bow side opening door – closed, top view

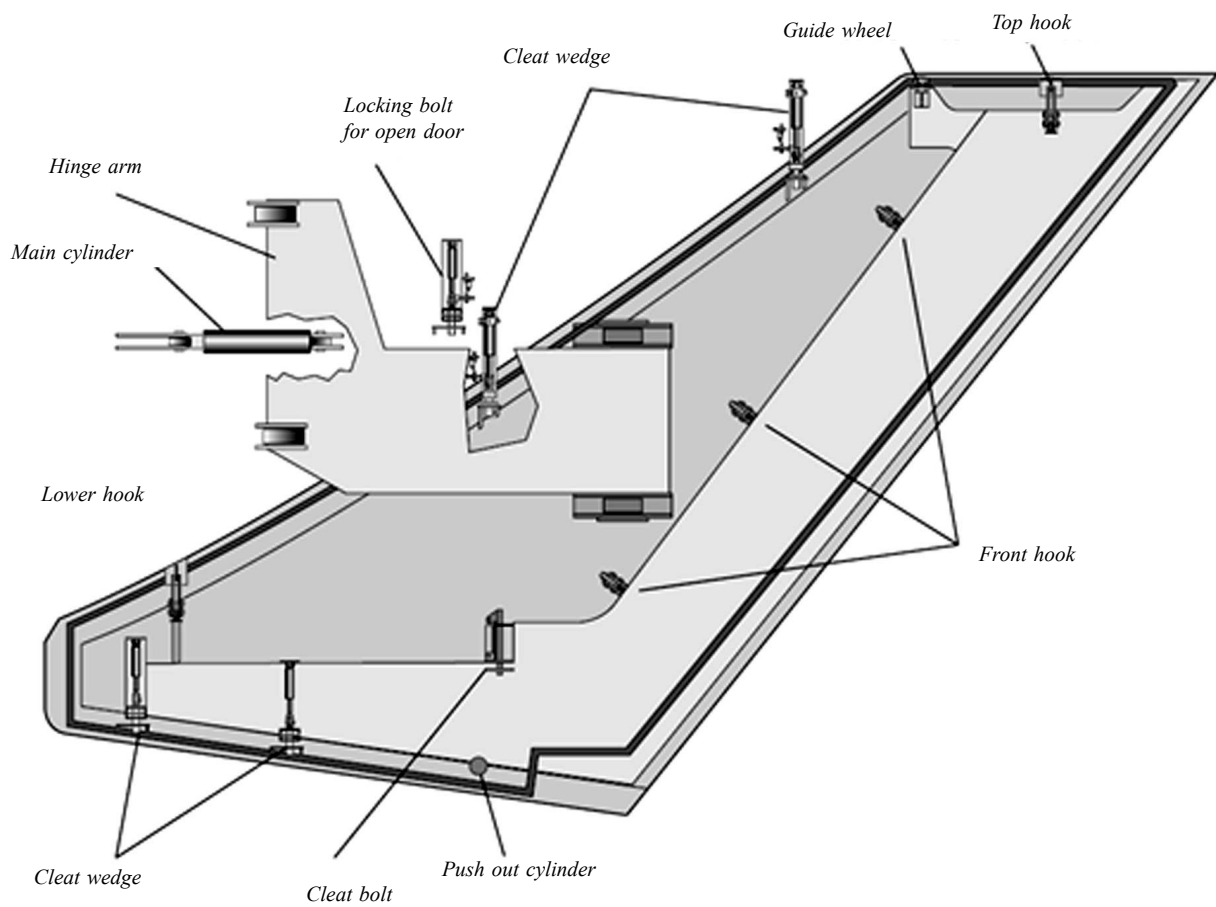


Fig. 11 Bow side opening door – door panel details

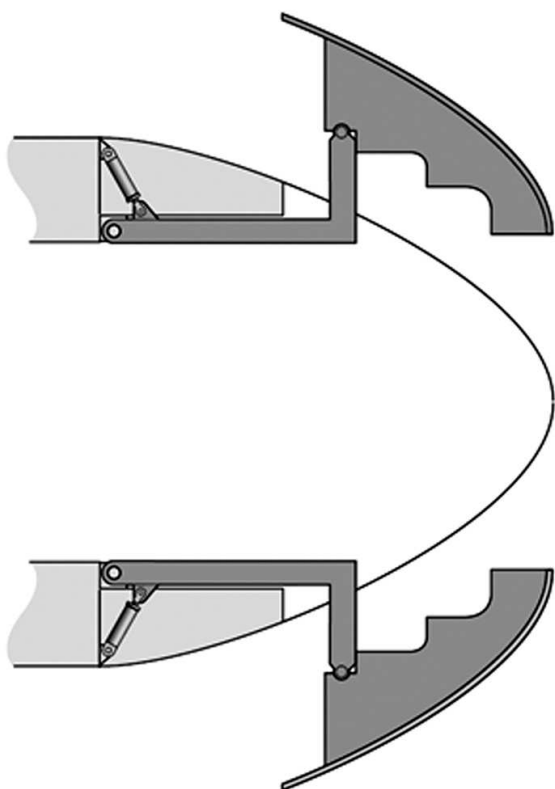


Fig. 12 Bow side opening door – open, top view

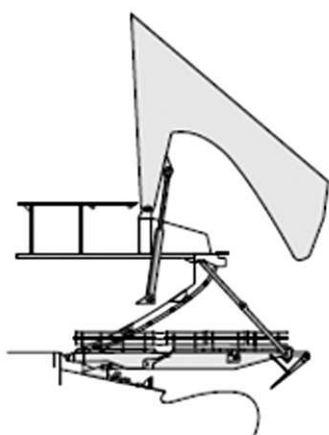


Fig. 13 Bow loading ramp – visor type bow doors, general arrangement

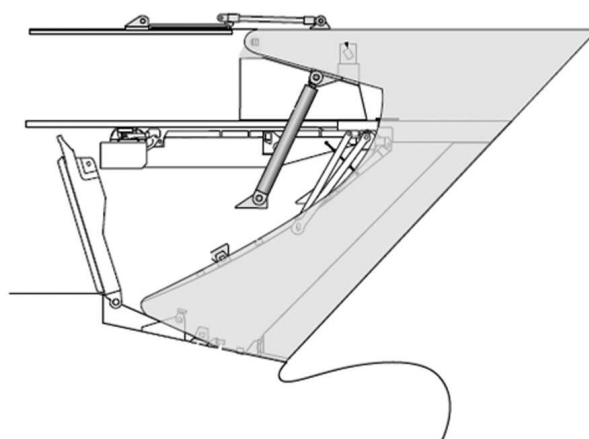


Fig. 14 Bow visor door – general arrangement



Fig. 15 Cleating hook 1

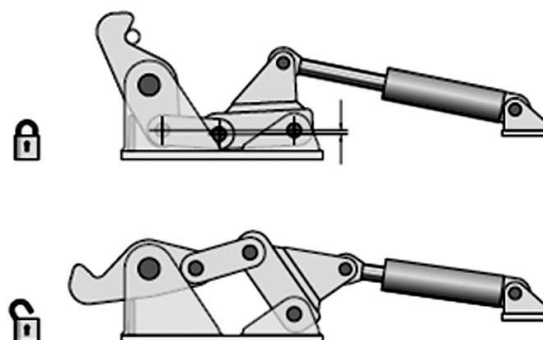


Fig. 16 Cleating hook 2

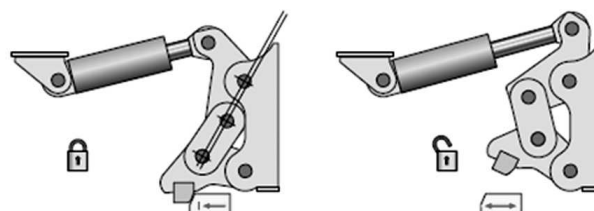


Fig. 17 Cleating wedge

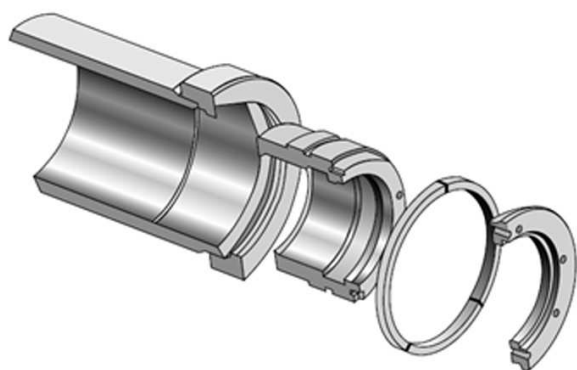


Fig. 18 Hydraulic actuators 1

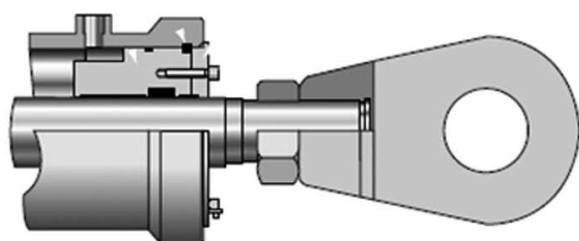


Fig. 19 Hydraulic actuators 2

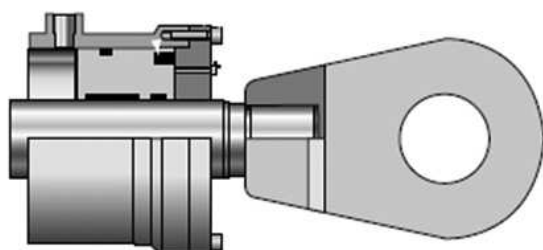


Fig. 20 Hydraulic actuators 3

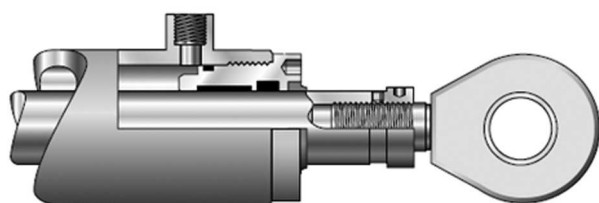


Fig. 21 Hydraulic actuators 4

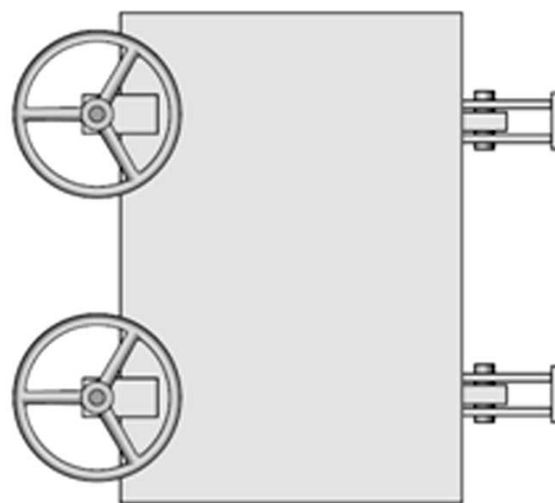


Fig. 22 Control panel – closing door

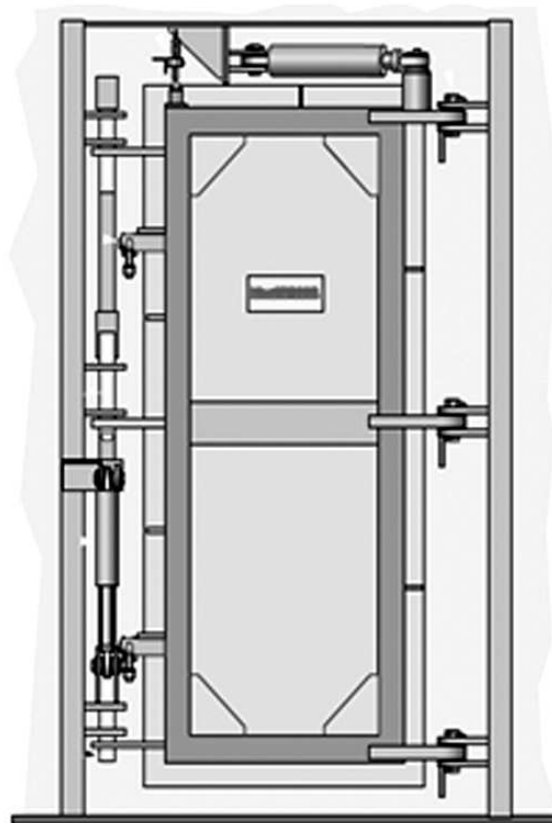


Fig. 23 Bunker door closed

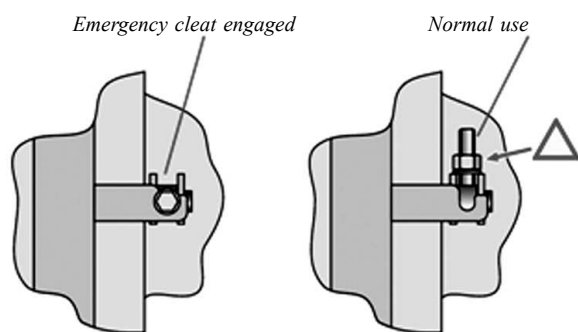


Fig. 24 Bunker door – Emergency cleat

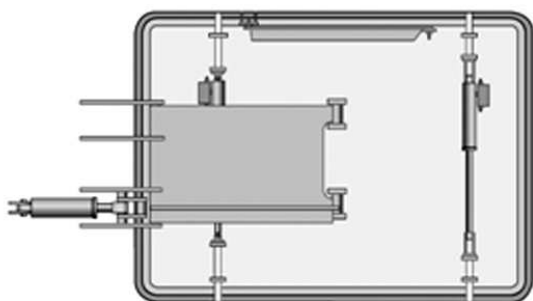


Fig. 25 Bunker port – type 1, closed, inside view

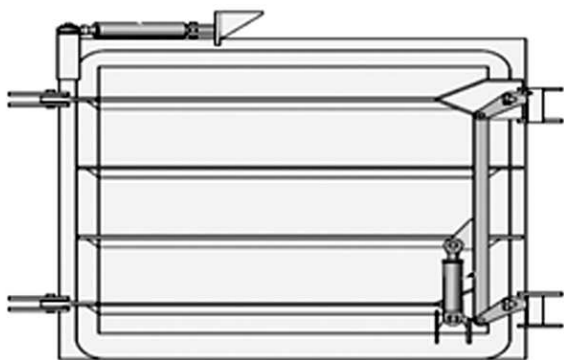


Fig. 26 Bunker port – type 2, closed, inside view

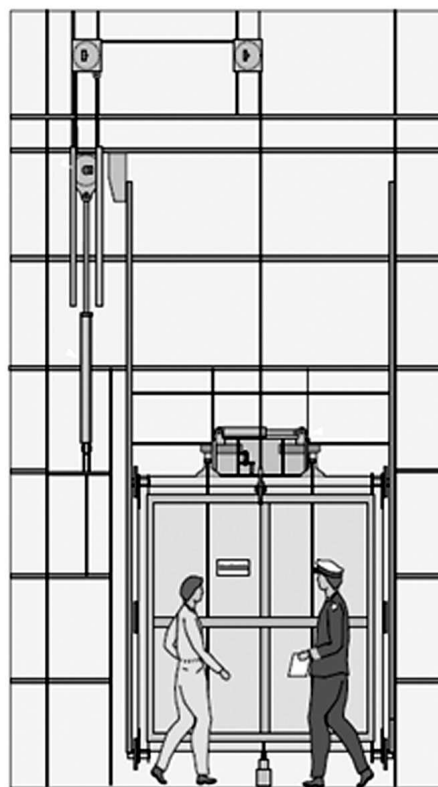


Fig. 27 Cargo door – closed, inside



Fig. 28 Cargo door – open, inside

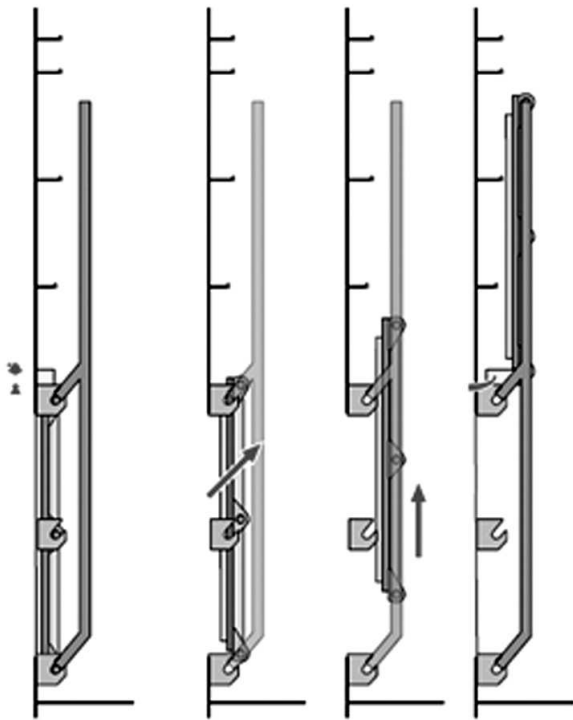


Fig. 29 Cargo door – principle function

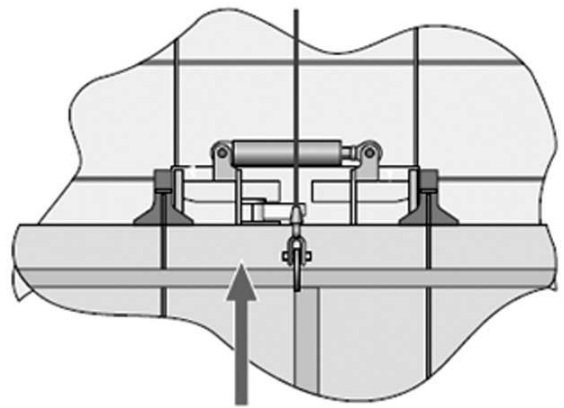


Fig. 30 Cargo door – top side hydraulic securing device disengaged

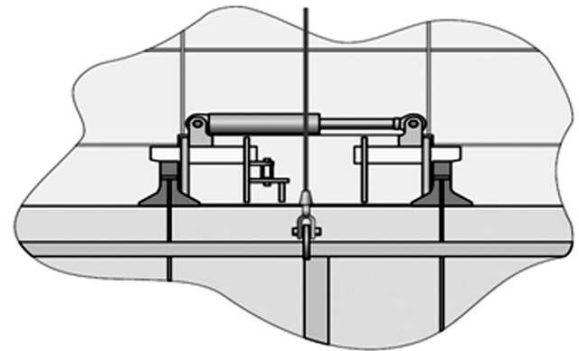


Fig. 31 Cargo door – top side hydraulic securing device engaged

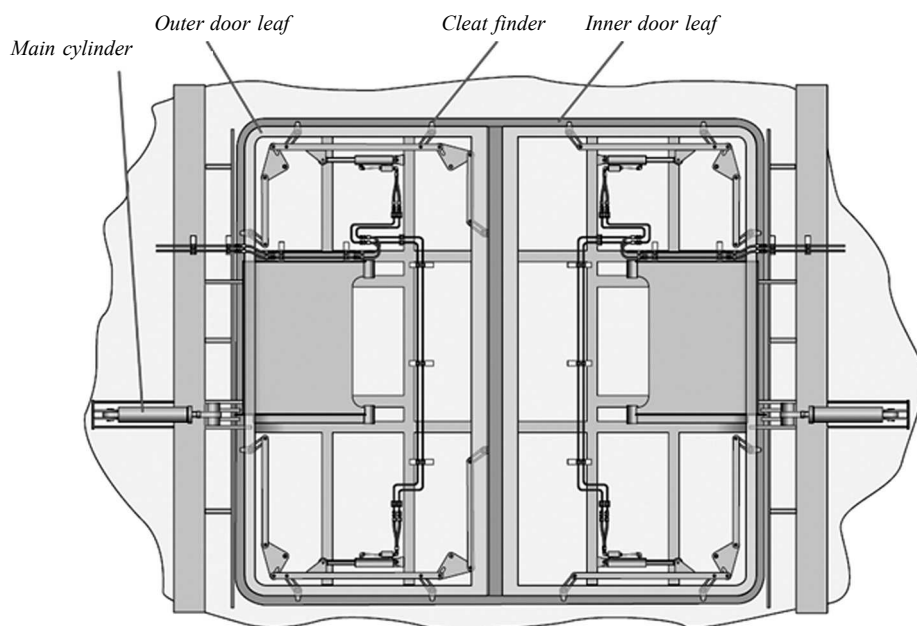


Fig. 32 Side shell door – double leaf, closed, inside view

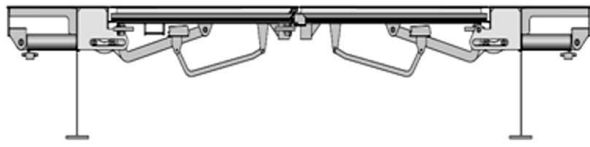


Fig. 33 Side shell door – double leaf, closed, top view

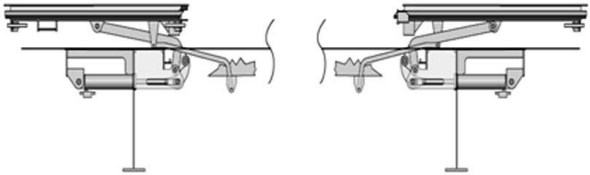


Fig. 34 Side shell door – double leaf, fully opened, top view

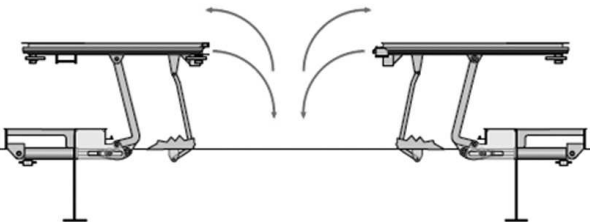


Fig. 35 Side shell door – double leaf, half opened, top view

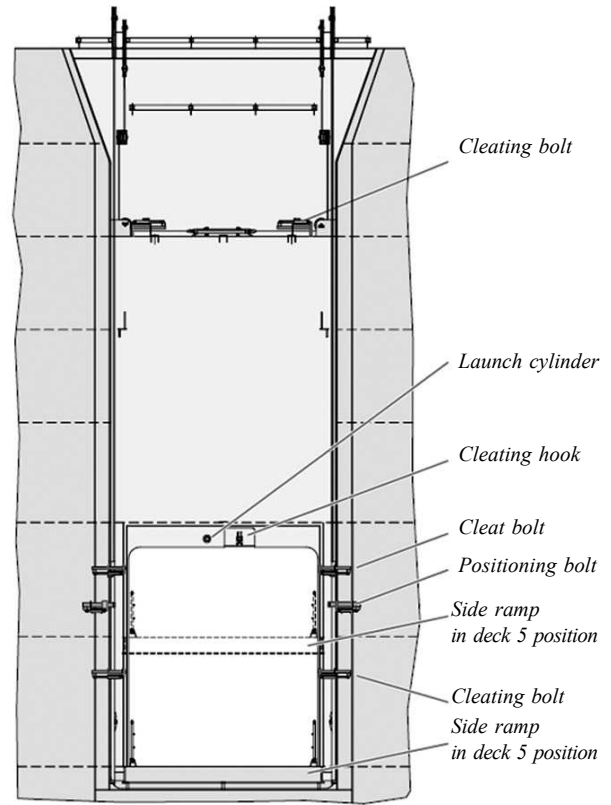


Fig. 37 Side ramp – front view

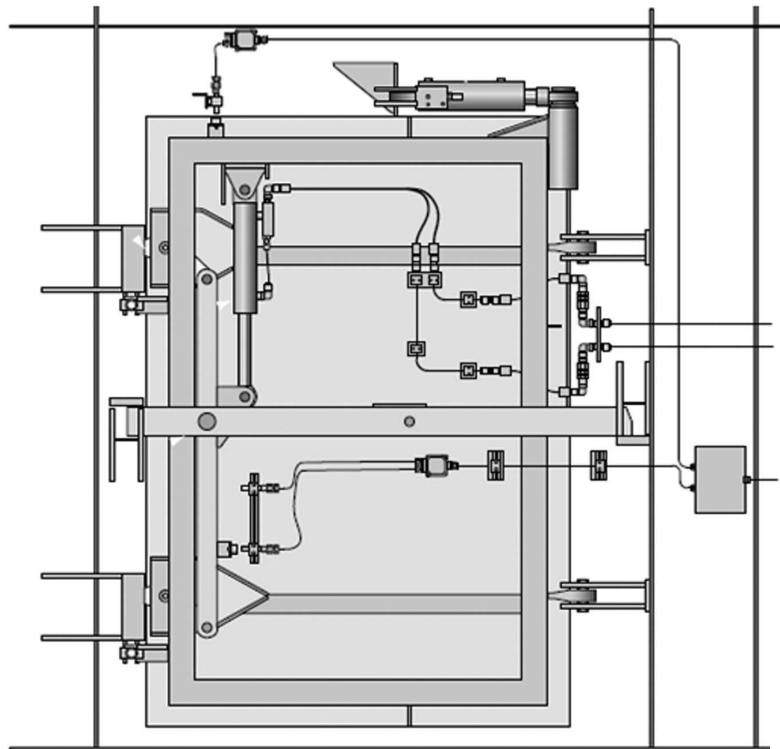


Fig. 36 Pilot door – inside view

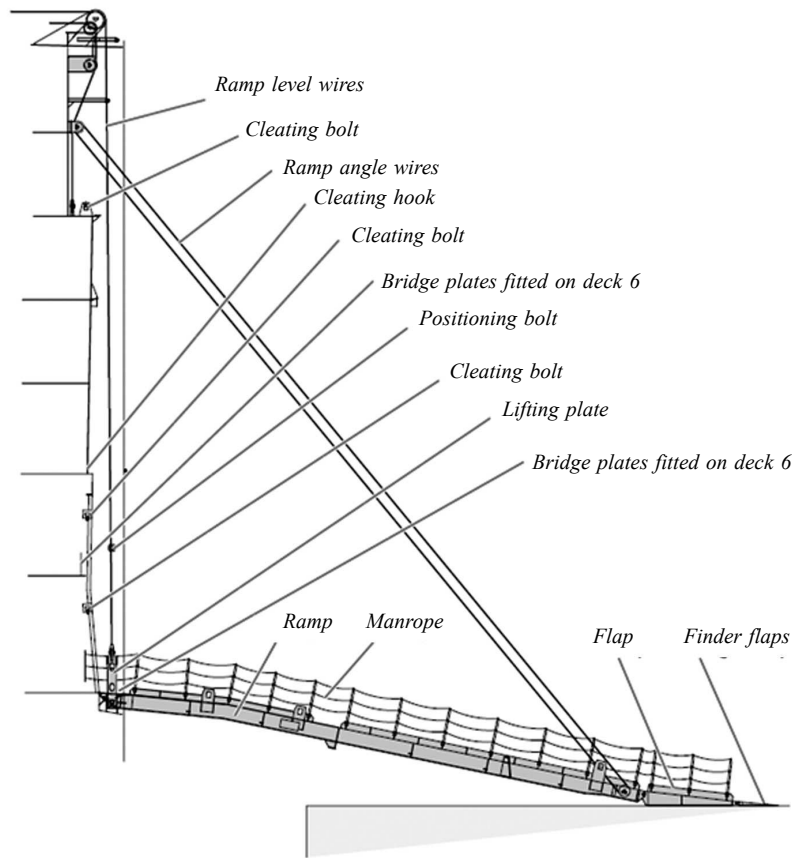


Fig. 38 Side ramp – side view

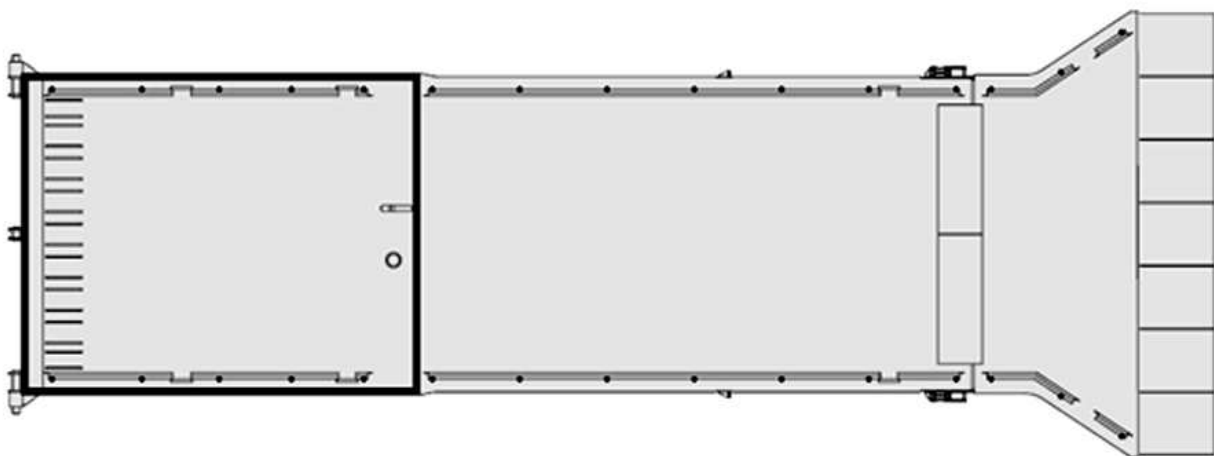


Fig. 39 Side ramp – top view

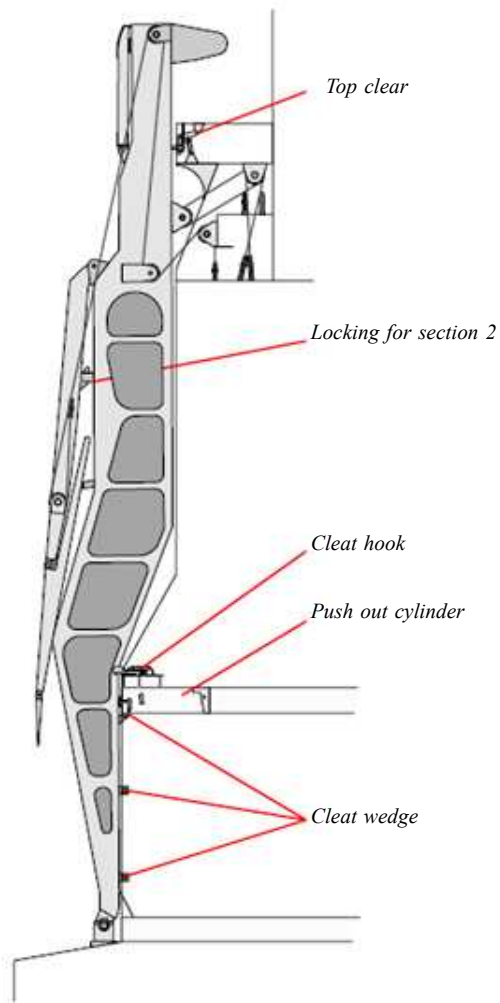


Fig. 40 Stern door – single leaf, closed, car carrier type

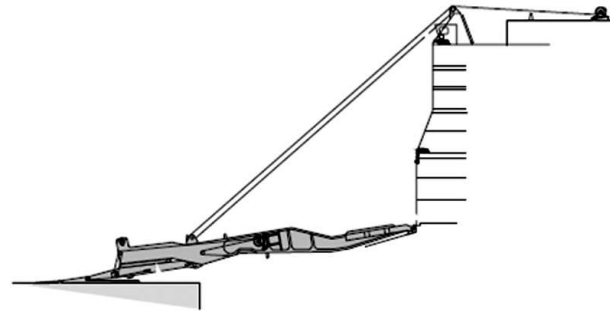


Fig. 42 Stern door – single leaf, open, car carrier type

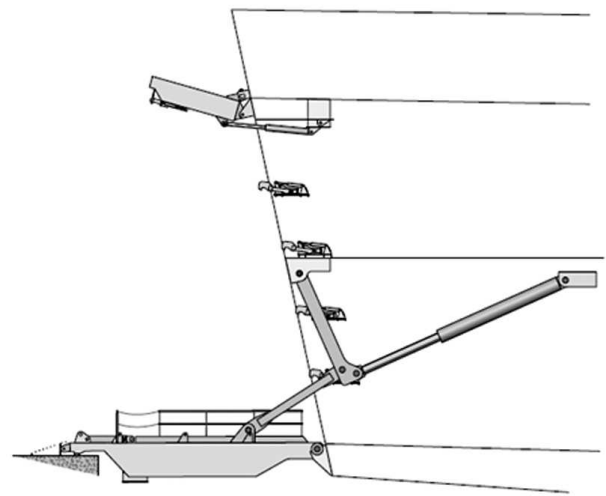


Fig. 43 Stern door – double leaf, open, typical cleating arrangement

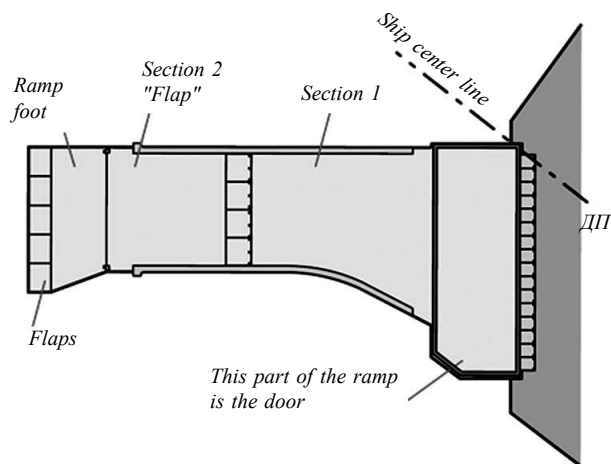


Fig. 41 Stern door – single leaf, open, car carrier type, top view

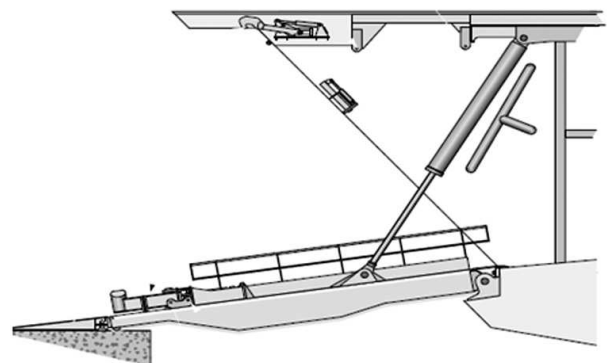


Fig. 44 Stern door – single leaf, open typical cleating arrangement, type 1

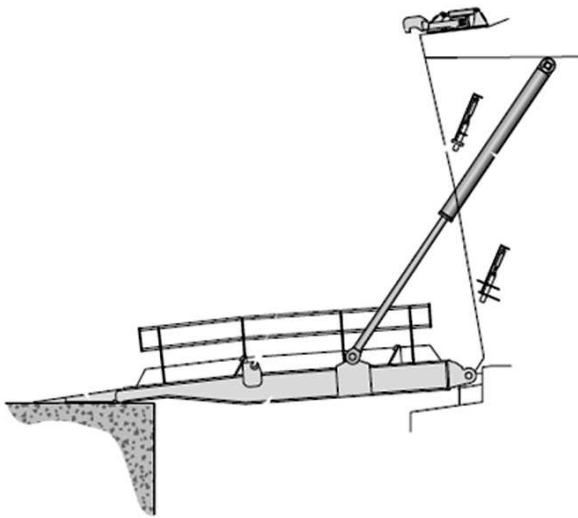


Fig. 45 Stern door – single leaf, open, typical cleating arrangement, type 2

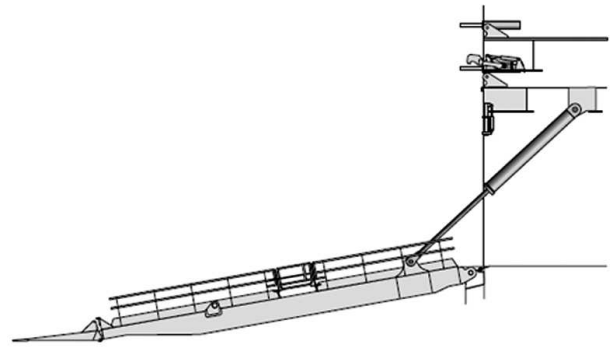


Fig. 48 Stern door – single leaf, open

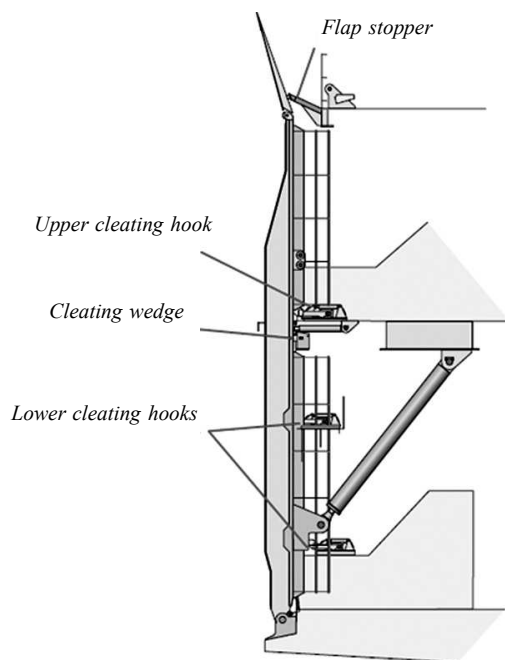


Fig. 47 Stern door – single leaf, closed, typical cleating arrangement, type 3

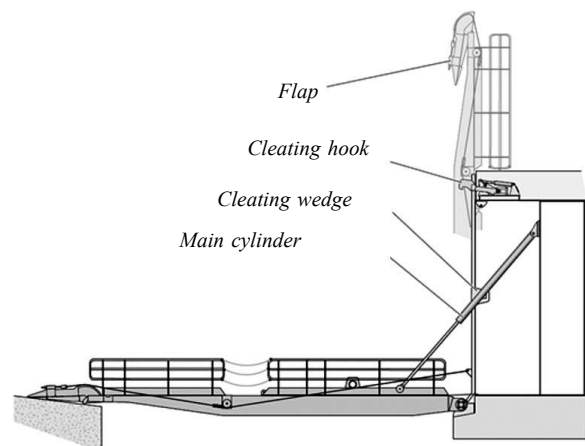


Fig. 49 Stern door – single leaf, open, typical cleating arrangement, type 3

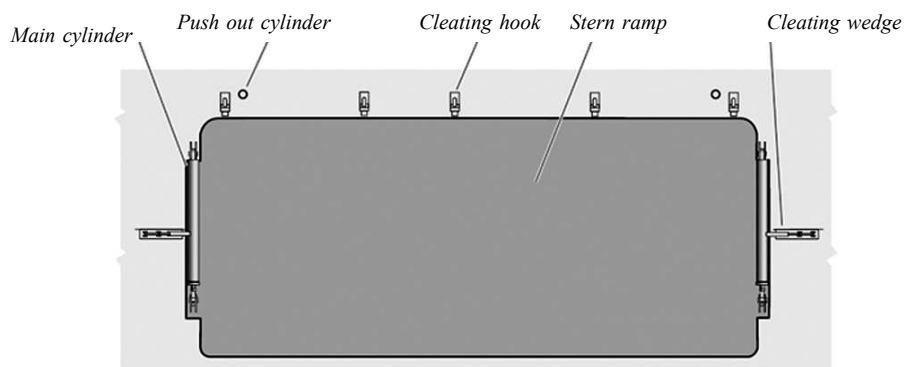


Fig. 46 Stern door – single leaf, closed, inside view, typical cleating arrangement, type 3

35. INSTRUCTIONS FOR SURVEY OF MAIN STEERABLE PROPELLERS BASED ON TECHNICAL CONDITION MONITORING

1 GENERAL

1.1 These Instructions provide for the implementation on board the ships the technical condition monitoring system for main steerable propellers (MSP), define for the Register Branch Offices and shipowners the conditions and procedure of MSP survey when the ship operates under technical condition monitoring system.

The MSP technical condition monitoring system is implemented on the shipowner's request. In this case the conditions and procedures given in Section 2 shall be observed.

The implementation on board the ship the MSP technical condition monitoring system is certified by an appropriate entry introduced in Russian and English in column "Other characteristics" of the Classification Certificate issued to the ship.

1.2 These Instructions are intended for technical condition monitoring of the elements of main steerable propellers of two types:

- mechanical ones with a two-stage bevel gear (e.g. Aquamaster);

- podded electric propulsion units (e.g. Azipod).

Methodological instructive regulations of these Instructions may also be used for the control and assessment of technical condition of auxiliary steerable propellers.

1.3 Provision of ships with the MSP technical condition monitoring system may be performed taking into account the requirements set forth in Section 11, Part VII "Machinery installations" of the Rules for Construction.

1.4 These Instructions are intended for use:

- by the surveyors to the Register, as applicable for MSPs of different types, during acceptance tests and when carrying out surveys for control and assessment of their technical condition;

- by the ship's crew when performing technical condition monitoring of MSP in operation and when submitting information required for survey within the scope of MSP technical condition monitoring system;

- by the Register-recognized organizations and the specialists in testing and fault detection (assigned by the shipowner) who carry out control and assessment of technical condition of the ship's facilities using the equipment for diagnostics and non-destructive testing.

1.5 These Instructions requirements provide a basis for developing, when justified, work procedures for technical condition monitoring of MSPs of particular types.

The work procedures are intended for their use by the Register-recognized organizations, specialists in testing and fault detection (assigned by the shipowner) and/or the ship crew.

The work procedures shall take into account structural features of the MSP of particular type and operational particulars of the ship wherein it is fitted.

1.6 The work procedures for MSP technical condition monitoring shall include:

- methodological instructions on carrying out technical condition monitoring using the equipment for diagnostics;

- the list of monitored parameters, frequency of their monitoring and norms of permissible values;

- recommendations on locating measurement points, lubricating oil sampling points with due regard for providing access to sensors and measuring instruments;

- the comparison of the monitoring results and the prediction of the MSP technical condition;

- the ways and forms of submitting the monitoring results.

1.7 Fulfillment in full measure of these Instructions requirements by the shipowner, and keeping the monitored parameters within the established limits with due account of their trends, form the grounds for the surveyor to Register for carrying out survey of the MSP elements without dismantling or with partial dismantling.

2 PROCEDURE FOR IMPLEMENTING THE MSP TECHNICAL CONDITION MONITORING SYSTEM

2.1 To introduce the MSP technical condition monitoring system the shipowner or ship's operator submits to the RS Branch Office for in-service supervision a request containing the following information: particulars of the MSP (type, year of manufacture, operating time, repairs made, replacements, etc.); task list and maintenance schedule for MSP, including measurements of monitored parameters and other arrangements to ensure technical condition monitoring of MSP elements;

data on technical condition monitoring of MSP elements (provision of equipment for diagnostics on board the ship, engagement of shore-based laboratories in the control of technical condition of the MSP elements, provision of lubricating oil sampling and its analysis, availability of forms for recording the results of technical condition monitoring, etc.);

responsible persons ashore (from Fleet Operation Department) and onboard (chief engineer as a rule).

2.2 The Register Branch Office shall register the request and after reviewing the request it reports in writing to the shipowner or ship's operator on its confirmation which these latter use to issue an order on implementation the MSP technical condition monitoring system on board the ship.

3 ORGANIZATIONAL PRINCIPLES OF MSP TECHNICAL CONDITION MONITORING

3.1 The control and assessment of the technical condition of the MSP elements may be performed by the ship's crew, specialists in testing and fault detection (assigned by the shipowner) or by the organizations specializing in the maintenance and/or monitoring of the technical condition of ship's equipment and hull structures.

3.2 The specialists in testing and fault detection (assigned by the shipowner) and the organizations engaged by the shipowner in conducting measurements and issuing a conclusion on technical condition shall be recognized by the Register to perform such activities.

The procedure for recognition of these organizations is set forth in Part I "General Regulations for Technical Supervision" of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships.

To be recognized by the Register in survey of these organizations, the Surveyor to the Register shall verify that:

the guidance documents and procedures to be observed during testing the items of survey are approved by the Register and available onboard;

the pertinent documentation for recording the testing results is available;

the pertinent portable calibrated equipment for diagnostics and non-destructive testing is available;

the specialists conducting testing and fault detection of the ship's items have undergone special training and have the relevant certificates.

4 MSP TECHNICAL CONDITION MONITORING ITEMS AND PARAMETERS

4.1 The MSP primary elements are as follows:

electric propulsion motor (for podded electric MSP);

shafting (for mechanical MPS);

propeller shaft;

- thrust-journal roller bearings of the propeller shaft and shafting;
- shaft seals;
- gearing (reduction gear) transmitting torque from a prime mover to a propeller via a vertical shaft (for mechanical MSP);
- coupling (for mechanical MSP);
- MSP turning mechanism;
- hydraulic motors, high-pressure lubricating oil pumps;
- auxiliary equipment.

4.2 A complex method using built-in and portable equipment for diagnostics may be applied to monitor the technical condition and to detect the malfunctions of MSPs.

4.3 The MSP condition monitoring consists of the following steps:

- determination of the MSP operating time and modes of its operation in service;
- bringing the MSP, as an item to be monitored, to the mode assigned (close to the rated one);
- recording monitored parameters, ambient conditions and control effects;
- prediction of change in the monitored parameters (trend analysis) which can cause certain malfunctions;
- providing recommendations on the necessary maintenance and/or repairs.

4.4 Norms of permissible values for monitored parameters, wear, clearances, working surface condition given in manufacturer's instructions, RS rules, industry regulatory documents are used as standards for the assessment of MSP technical condition.

Where the relevant guidance in the operating instructions for the steerable propeller and other documents is not available, the norms of permissible values for monitored parameters shall be developed based on the GOST R and ISO recommendations. The norms shall be technically supported by special studies, operational experience, technical analogues and prototypes.

4.5 The assessment of technical condition and identification of malfunctions in the technical condition monitoring system of the MSP are based on comparison of the current operational parameter values with the specified norms of permissible or reference (calibrated) values. The characteristics of new or repaired MSP obtained at sea trials or during the first loaded voyage shall be assumed as the reference values of parameters.

Comparing current (operational) values with reference values of monitored parameters, the same operating mode of the MSP, and the same (similar) external effects and ambient conditions shall be considered.

Therefore, the relevant dependences on operation conditions (propeller shaft (propeller) speed and loads) shall be obtained for reference values of monitored parameters.

4.6 Methods of MSP complex monitoring:

.1 monitoring of MSPs using standard built-in and portable equipment for diagnostics:

control of MSPs by means of technical condition monitoring systems allows their testing, including parametric, vibration, temperature monitoring, lubricating oil analysis and other types of control.

Table 1 presents a diagnostic matrix for detecting the malfunctions of the MSP elements;

.2 analysis of lubricating oil quality carried out on board the ship using ship's portable laboratories and in shore-based laboratories:

assessment of lubricating oil quality by determining metal contents (wear products), mechanical admixtures, water and other components therein measuring changes in physical and chemical properties of oil;

.3 vibration measurement (vibration control):

assessment of the MSP condition and its individual units and aggregates under vibration;

.4 measurement of shock pulses:

assessment of condition of roller bearings, drive units, reduction gears, etc.;

.5 temperature monitoring of MSP:

determination of temperature of parts, units, surfaces, hydraulic fluids using fixed and/or portable (contact and non-contact) devices;

.6 optical inspection using endoscopes:

condition monitoring of roller bearings, gearings, enclosed units, elements and auxiliary machinery;

Table 1

Table for technical condition monitoring of MSP elements

Nos.	Malfunction	Monitored parameters										
		Vibra- tion	Tem- perature	Shock pulses	Gas escape/ fluid leakage	Opera- tional cha- racteris- tics	Pressure/ vacuum	Lubri- cating oil quality	Speed	Power	Linear dimen- sion	Optical ins- pection (endo- scope)
1	Bearing damage	+	+	+	+	+		+	+	+	+	+
2	Bearing wear	+	+	+	+			+				
3	Assembly inaccuracy	+	+	+								+
4	Seal damage	+	+		+		+	+				+
5	Electric propulsion motor failure	+	+		+	+			+	+		+
6	Cooling, lubrication and drain- age systems failure	+	+			+	+					+
7	Damaged gearing of propeller shaft drive, and rudder and steering gear	+	+	+	+			+	+	+		+
8	Malfunctions of system valves	+		+		+	+					+
9	Propeller damage	+		+						+	+	+
10	Malfunction of MSP machinery: pumps, fans, prime mover transmission	+	+	+		+	+	+	+			+
11	Unbalance	+		+								
12	Shafts misalignment	+	+	+							+	

.7 visual examination:

examination of condition of the shaft propeller, seals, bearings, gearings and other MSP elements;

.8 tightness control:

determination of tightness of gland seals, receivers and other enclosed spaces;

.9 non-destructive testing (dye penetrant, magnetic particle, ultrasonic, etc.) of components condition:

detection of defects like material discontinuities (cracks, pores, cavities, hairlines, separations, etc.), and also of internal defects (cracks, pores, non-adherence, lack of fusion, etc.).

5 SURVEYS**5.1 Initial survey.**

Initial survey is carried out to confirm that:

the MSP condition is completely monitored in compliance with the requirements of Sections 1 to 3 of these Instructions;

the monitoring procedure for MSP is operational for at least six months, the records with the results of measurements of monitored parameters are available, and these parameters values are within a permissible range;

the responsible persons assigned by the shipowner have familiarized with the operating principles and capabilities of the MSP technical condition monitoring system.

The satisfactory results of survey provide a basis for approval and confirmation of the MSP technical condition monitoring system implementation.

Upon the survey results the surveyor to the Register draws up a report, makes entries on the MSP technical condition monitoring system implementation on board the ship into the Classification Certificate and Ship's Survey Status.

5.2 Annual survey.

Annual survey is carried out to:

monitor the MSP technical condition;

check the execution of MSP technical condition monitoring and to identify when early failure of its elements is likely to occur;

check the records of the results of measurements of monitored parameters, to review the trends of vibration measurements and lubricating and hydraulic oils analysis obtained after the previous annual survey;

assess the use of condition monitoring results in maintenance;

check the calibration of ship's equipment for diagnostics;

check the proper functioning of all the alarm and protection elements.

Based on the results of annual survey, the surveyor to the Register makes entries into the check list (Form 6.1.01) and Ship's Survey Status on the implementation the MSP technical condition monitoring system on board the ship.

Where necessary, the surveyor may require testing, additional measurements or examination of the MSP elements to be carried out.

5.3 Special survey.

Special survey is carried out to:

assess the technical condition of the MSP elements and to extend the MSP technical condition monitoring system operation time.

In addition to checks performed during annual survey, the following may be carried out:

testing the MSP functional capabilities at sea trials;

pitch control unit (if any) testing;

alarm and protection elements functional testing;

the revision of basic data for monitored parameters, where necessary.

The MSP shall be tested in operation in the course of the similar operational testing of main machinery.

Where necessary, the surveyor may require additional measurement or inspection of the MSP elements.

Based on satisfactory results of survey, the complete dismantling of MSP for thorough examination is unnecessary. Where measurements demonstrate the potential degradation of technical condition of the MSP elements, the surveyor may require dismantling for thorough examination.

6 NORMATIVE AND METHODOLOGICAL BASIS OF THE MSP TECHNICAL CONDITION MONITORING SYSTEM

6.1 Parametric monitoring.

6.1.1 When MSP is in operation its working parameters are subject to systematic control with standard measuring instruments, special sensors and recorders.

When monitored parameters are beyond the range specified in operating instructions, the causes thereof shall be ascertained, and where necessary, the parameter shall be regulated and the causes of its alteration shall be eliminated. In justified cases, detailed control is carried out with special instruments and equipment for diagnostics.

6.1.2 The list of monitored parameters and frequency of their control are specified by the shipowner following the operating instructions and the recommendations of the MSP manufacturer considering MSP reliability, automation, alarm and monitoring, safety and complete set of equipment for diagnostics.

During MSP operation the following shall be periodically controlled:

shaft power or drive engine power;

propeller speed;

lubricating oil pressure and temperature in the lubrication systems of the propeller shaft bearings and within the reduction gear drive;

oil level in gravity, head and drainage tanks;

oil pressure, temperature and level in the hydraulic turning mechanism of MSP;

oil flow in the lubrication systems of propeller shaft bearings, oil level within the bearing housings;

filter resistance in the lubrication system of propeller shaft bearings;
functioning of control, alarm, automation and safety systems;
level of propeller shaft bearings vibration (if fixed sensors are fitted);
cold and hot air temperature, as well as its humidity in the air cooling system of electric propulsion motor, pressure fall at an air filter;
current in the prime movers of the MSP auxiliary machinery (pumps, fans, hydraulic motors, etc.);
oil and water level in bilge wells of the hull and MSP spaces.

6.2 Lubricating oil quality control.

6.2.1 The normal process of oil aging resulting in gradual changes in monitored parameters is disturbed due to the MSP or lubrication system failure. In this case substantial variation of one or more parameters occurs and the oil quickly loses its performance characteristics.

The analysis of the oil taken from the lubrication system of gearings and of the hydraulic system shall include at least the following parameters:

viscosity;
water contents;
oil oxidation;
mechanical admixtures content.

The watered oil shall be analyzed for chlorides, and the presence of sodium or magnesium shall be identified to indicate sea water penetration into the oil.

6.2.2 The oil samples shall be taken from MSPs and auxiliary machinery with a frequency and in locations specified in operating instructions, and shall be tagged (refer to 6.2.3).

6.2.3 Oil samples shall be taken under operating conditions or close to the rated ones at the working oil temperature not earlier than in 12 h of MSP operation after adding fresh oil up to the normal operating level in the expansion oil tank.

The sampling is executed with a vacuum pump or through a special sampling valve.

Prior to sampling about 500 ml of oil shall be discharged through the sampling valve. Oil samples shall be taken to a dry clean container filling approximately 3/4 of its volume.

Amount of the oil sampled (the volume of sample) shall not be less than 200 ml for a shipboard analysis, and not less than 500 ml for a laboratory analysis¹.

A sampling point shall be located before filter.

In sampling lubricating grease, it is of the first importance to have samples from the zone located close to the rolling bearing elements.

Containers for oil and grease samples shall be clean and moisture-free.

The container shall be tightly closed and have a tag with the following data:

name of the ship;
MSP type and brand;
mechanism name and brand;
oil brand;
duration of the oil use after initial oil filling and oil change (in h);
amount of oil added into the system after sampling for the last analysis;
date of sampling;
name and position of the person who has taken the sample;
signature of the chief engineer/person in charge, and the ship's stamp.

The samples shall always be taken from the same place specified in operating instructions for MSP.

6.2.4 The assessment of MSP condition in terms of oil control on board the ships is limited by the express analysis data which extent depends on the shipboard laboratory capacity.

The oil express analysis for MSP gearings and hydraulic system shall be carried out, as a minimum, to determine the water contents, viscosity and contamination².

¹Testing laboratory carrying out an oil analysis may establish another sample volume.

²Shipowner may apply to a shore-based laboratory for all the analyses, but the dates of analyses performance shall be

Portable laboratories and ferroindicators are used for the express analyses of engine, turbine and hydraulic oils on board the ships.

The use of ferroindicator on board the ship allows to determine the higher iron content in working lubricating oil which appears to be the evidence of increased wear rate of the MSP elements.

6.2.5 Shore-based laboratories carry out physical and chemical analyses to determine the rejected parameters for lubricating and hydraulic oils (refer to Table 2), the concentration of wear products (refer to Tables 3 and 4) and oil purity (refer to Table 5) using spectral method, and the number and size of wear particles (refer to Table 6) using ferrographic method.

Note. The ferrographic method is recommended to supplement the control of gearings and roller bearings wear.

The standards for the rejected parameters of concentration of wear products and oil purity given in Tables 3 to 5 are based on the ISO 14830-1 recommendations.

Table 2

Standards for rejected parameters of MSP oils

Nos.	Parameter	Permissible level (category A)	Ranged permissible level (category B)	Unacceptable level (category C)	Methods for determination
1	Kinematic viscosity at 40 °C, deviation from the initial one, %	> +10...< -10	$\pm 10 \dots \pm 15$	> +15...< -150	GOST 33-00
2	Water content, %	< 0,2	0,2...0,5	> 0,5	GOST 2477-65
3	Oil acid, mgKOH/gOIL	< 1	1 — 2	> 2	GOST 11362-96
4	Mechanical admixtures content, %	< 0,02	0,02 — 0,05	> 0,05	GOST 6370-83

Table 3

Concentration of wear products in MSP gears and gearings (in ppm) according to ISO 14830-1 after 500 hrs of operation

Metal	Potential sources	Normal content	Slightly increased content	Increased content	High content
Iron, Fe	Reduction gear, bearings, filter	0 — 100	101 — 150	151 — 300	> 300
Chromium, Cr	Bearings	0 — 4	5 — 10	11 — 15	> 15
Lead, Pb	Bearing linings	0 — 30	31 — 50	51 — 80	> 80
Copper, Cu	Bearing bush	0 — 30	31 — 50	51 — 80	> 80
Aluminium, Al	Housing	0 — 10	11 — 20	21 — 30	> 30
Silicon, Si	Mud, brakes lining	0 — 20	21 — 30	31 — 60	> 60
Sodium, Na	Salt, additives	0 — 30	31 — 50	51 — 80	> 80

Table 4

Concentration of wear products (in ppm) in MSP hydraulic systems according to ISO 14830-1 after 500 hrs of operation

Metal	Potential sources	Normal content	Slightly increased content	Increased content	High content
Iron, Fe	Teeth, valves	0 — 38	9 — 15	16 — 25	> 25
Chromium, Cr	Cylinders, rods	0 — 33	4 — 8	9 — 15	> 15
Lead, Pb	Bearing linings	0 — 34	5 — 10	11 — 15	> 15
Copper, Cu	Bearing bush	0 — 38	9 — 15	16 — 25	> 25
Aluminium, Al	Housing	0 — 33	4 — 8	9 — 15	> 15
Silicon, Si	Mud, dirt	0 — 35	6 — 10	11 — 20	> 20
Sodium, Na	Salt, additives	0 — 30	31 — 50	51 — 80	> 80

Table 5

Rejected parameter values for oil purity (in ISO 4406 codes) according to ISO 14830-1 for MSP hydraulic systems and reduction gears

Type of mechanism	Degree of contamination									
	Low		Moderate		Increased		High		Very high	
Hydraulic systems and bearings	10/08	15/12	15/13	17/14	17/15	19/16	19/17	22/19	22/20	>25/—
Gearings and reduction gears	15/12	16/13	16/14	18/15	18/16	21/18	21/19	24/19	24/22	>25/—

6.2.6 Standards for rejected parameters.

6.2.7 The information on the qualitative condition and quantitative composition of the oil sample allows reliable, prompt assessment of machinery condition and identification of potential defects. The qualitative analysis restricts the search for locations of visible wears, and the quantitative one makes it possible to ascertain the expediency and conditions of further operation of the control item, and to determine the dates and extent of maintenance and repairs.

The values of the MSP working lubricating oil quality parameters (refer to Tables 2 to 6) indicate the technical condition and potential failure in a certain period of time, and are termed as follows:

"Normal" = normal wear;

"Slightly increased" = parameter values within this range indicate the first signs of wear increase, and the trend shall be traced.

"Increased" = parameter values indicate an increased (abnormal) wear. Checking analysis shall be carried out, sampling frequency shall be increased and measures on wear stabilization and reduction shall be taken.

"High" = parameter values indicate a major (inadmissible) wear. Repeated analysis to identify a specific unit, to ascertain wear causes and take measures on their elimination are required.

When carrying out survey on the basis of MSP technical condition monitoring system, in terms of the Register binary assessment ("in compliance with the RS requirements"/"Not in compliance with the RS requirements"), the high values of working lubricating oil parameters do not constitute grounds for the surveyor to the Register for recognizing such item as Complying with the RS requirements until the causes of high wear are identified and eliminated.

Table 6

Rejected parameters for concentration and number of large wear particles, and wear indices for the MSP reduction gears and gearings

Ferrographic parameters	Limiting values	Analysis frequency
Wear particles concentration (number of particles per 1 cm ³)	60	At least once every six months
Percent of large particles, %	55	
Wear index: $I = (D_L^2 - D_S^2)/V^2$	1000	
where D_L = number of wear particles of more than 5 m in size, D_S = number of wear particles of less than 5 m in size, V = sample volume, in ml.		

6.2.8 The values of working lubricating oil parameters obtained from the analyses shall be used for establishing these parameters trend movement with time which allows to assess the changes in technical condition of the MSP elements.

6.2.9 Frequency of sampling and analysis.

6.2.10 Oil consumption in operation is determined by the amounts of oil added in the expansion or gravity tank and shall not exceed the standards specified in operating instructions. The amount of oil added shall be entered in the ship's records.

6.2.11 The analysis of sediments (deposits) on magnetic plugs is carried out with 20x lens or microscope. If the latter is used, the sediments are deposited on object-plates.

Where analytical ferrograph is used, the analysis is carried out using a special atlas (oil sample taken from an oil tank is used) with wear products characteristic.

Table 7

Nos.	Type of analysis	Frequency of analysis	
		Onboard	Ashore
1	Express analysis on board the ship (refer to 6.2.4)	Every month or after 200 h of operating time	—
2	Rejected parameters (Table 2)	—	At least once every three months
3	Oil purity (Table 5)	—	At least once every three months
4	Concentration of wear products (Tables 3 and 4)	—	At least once every six months

6.3 Vibration control.

6.3.1 The measurement of vibration parameter values for assessment of the MSP elements condition may be part of acceptance tests in ship's commissioning and shall be carried out when the ship is in service.

6.3.2 Measured parameters.

The parameters to be measured are the root-mean square (RMS) values of displacements, vibration rate and vibration acceleration, and also vibration spectrum within specified frequency band.

In measuring wideband vibration, the root-mean square value of the vibration rate (in mm/s) within frequency band of 2 to 1000 Hz is determined. The vibration rate may be presented in logarithmic scale (in dB) using value of 5×10^{-5} mm/s as a reference one.

The root-mean square value of the vibration rate shall be measured in 1/3-octave band or in octave bands.

The determination of wideband vibration, as the characteristic of general vibration condition, is not sufficient for the assessment of technical condition of the MSP elements. The general vibration level renders detection of a specific malfunction impossible. For this purpose, it is necessary to analyze the vibration frequency components, phase relationships, an envelope, cepstral analysis and other contemporary methods.

If the information about the vibration spectral data is required, a frequency analysis (Discrete Fourier Transform) within frequency band of a constant width in 1/3-octave band is carried out using an analyzer with the permanent relative width of a frequency band.

6.3.3 Vibration pickup and attachment thereof.

To provide a linear frequency characteristic over the entire band of frequency measurements and to prevent the sensor resonance frequency from falling within this band, compact velocity and acceleration sensors less than 60 g in mass shall be used for measurement.

The resonance frequency of the vibration pickup fitted shall be outside the analysis band. The pickup attachment method shall ensure data reliability over the entire measurement band. It is well to bear in mind that all the attachment pins placed between the pickup and vibration surface may change a pickup conversion ratio and, therefore, may introduce an error into the measurement results.

The attachment of the vibration pickup by a pin is considered to be the most reliable and recommended method. For this purpose, a hole is drilled and tapped at the pickup location and the pickup is installed using a pin. In consecutive measurements at various points over the "route", the pickup may be installed on a magnet or manual pickups may be used because the maximum frequency does not exceed 1000 Hz.

If the pickup is fixed, it shall be attached by a pin. In this case the contact surface shall be clean and flat.

6.3.4 Measurement points.

Measurement points shall be located on the most rigid part of a structure. To avoid the impact of local resonances, vibration shall not be measured on the compliant parts or thin sheet elements of a structure.

The best place for location of vibration pickups is on the bearing housings where vibration levels and their trends are measured for the assessment of MSP technical condition.

Induced (background) vibration with the inoperative MSP shall be measured at the selected points and it shall be within 30 per cent of the vibration level obtained during testing the complex in operation.

Due to restricted access to a propeller shaft and its elements (bearings, seals, electric propulsion motor, gearing, etc.), it is feasible and advisable to make vibration measurements during the MSP operation:

for mechanical MSP: on the casing at forward and aft parts next to a driving shaft flange on the lower part of the casing in way of steerable propeller securing to the foundation;

for podded electric MSP: on the propeller shaft journal and thrust bearings using fixed vibration pickups with wiring or, where bearings are accessible, using temporary fitted vibration pickups when the ship is lying (for high-powered MSPs only).

As an example, the points of vibration measurement for mechanical and podded electric MSPs are shown in Fig. 1.

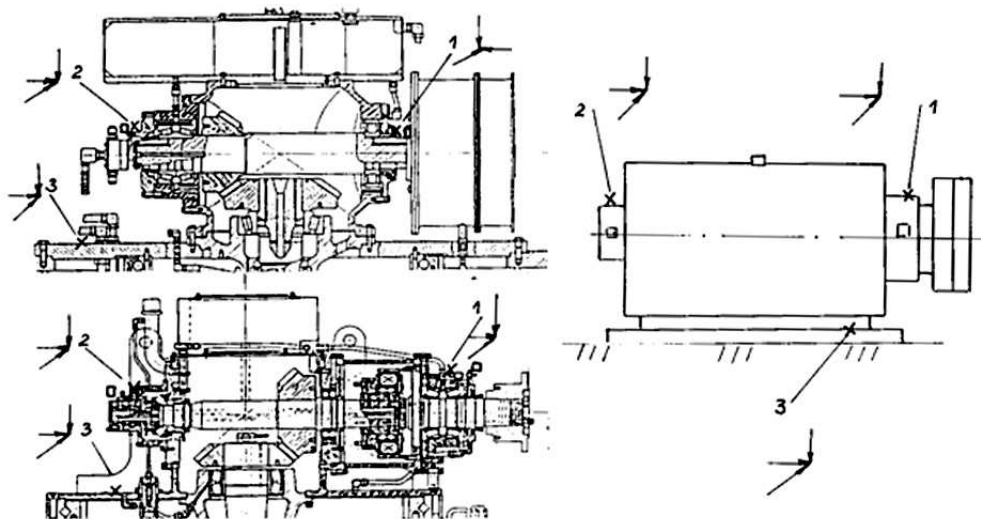
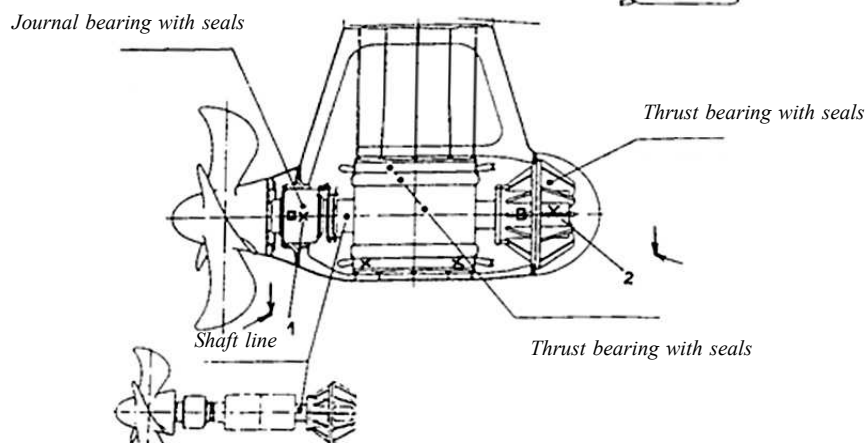
Mechanical MSP (e.g. Aquamaster type)**Podded electric MSP (e.g. Azipod type)**

Fig. 1 MSP measurement points
 × = vibration; □ = shock pulses

6.3.5 Measurement direction.

Measurements, as far as practicable, shall be carried out in three directions of Cartesian co-ordinates: X, Y and Z in compliance with the requirements of Section 9, Part VII "Machinery Installations" of the Rules for the Classification and Construction of Sea-Going Ships.

To monitor the condition of podded electric MSP propeller shaft under vibration, measurements may be limited to one direction (vertical). Two pickups shall be fitted for measurement of vibration in two directions (vertical and traverse).

6.3.6 Analysis in a narrow band.

To reveal harmonics and side bands of a signal, the processing in the narrow band of a permanent width is used.

The representative operating frequencies of MSP units vibration are calculated in compliance with the data given in Table 8.

Table 8

Basic representative frequencies of MSP units vibration

Parameter	Design formula	MSP	
		type 1	type 2
Basic frequency of drive shaft vibration, Hz	$f_0 = n_e/60$	+	+
Frequency of intermediate shaft vibration, Hz	$f_{in} = n_e/60i_{top}$	+	—
Frequency of propeller shaft (propeller) vibration, Hz	$f_{sh} = n_e/60i_{top}i_{bottom}$	+	$f_{sh} = n_{sh}/60$
Blade vibration frequency, Hz	$f_{blade} = f_{sh}Z_{blade}$	+	+
Frequency of top reduction gear vibration, Hz	$f_{top} = f_0Z_1$	+	—
Frequency of bottom reduction gear vibration, Hz	$f_{bottom} = f_{in}Z_2$	+	—
where n_e = engine speed, in rpm; n_{sh} = propeller shaft speed, in rpm; i_{top} = reduction ratio of top reduction gear; i_{bottom} = reduction ratio of bottom reduction gear; Z_{blade} = number of propeller blades; Z_1 = number of pinion teeth of top reduction gear; Z_2 = number of pinion teeth of bottom reduction gear.			

For mechanical MSP the defects of propeller shaft and lower toothing may be identified during their analysis in the narrow band operating frequencies by measuring vibration at the upper part of the MSP housing.

6.3.7 Performance of measurements.

To ensure comparable results and to establish trends in monitoring the MSP technical condition in operation, the measurements shall be performed under the same operating conditions and at the same points.

The measurements shall be carried out under steady operating conditions at the stable values of working temperatures and other parameters.

The measurements shall be carried out under the specified conditions of the MSP operation at the propeller shaft speed corresponding to a slow (in manoeuvring), half and full ship's speed on clear water.

Where the rated power mode (full speed) is, due to some reasons impracticable, the measurements are carried out at the maximum attainable power (rpm).

The requirements and standards specified in Section 9, Part VII "Machinery Installations" of the Rules for the Classification and Construction of Sea-Going Ships shall be met during measurement of vibration levels of the MSP elements accessible for measurements in operation (hydraulic pumps and motors, electric propulsion motors, toothings, etc.).

6.3.8 Estimation of measurement results.

The basic frequencies giving rise to the MSP vibration are usually within the band of 2 to 500 Hz. However it is recommended to consider an extended band of 2 to 1000 Hz for the assessment of condition of the MSP elements as a whole under vibration.

To assess the MSP condition under vibration in terms of general level, the limiting root-mean square values of vibration rate (acceleration) specified for operational conditions in three categories shall be known:

A = item condition after manufacturing;

B = item condition during normal operation;

C = impaired technical condition with probable malfunction; maintenance or repairs is required.

Where the MSP manufacturer's recommendations on the vibration standards for the specific MSP are lacking, the vibration standards for individual machinery given in Section 9, Part VII "Mechanical Installations" of the Rules for the Classification and Construction of Sea-Going Ships shall be used.

The measurement results are estimated in the following below ways.

The first method:

comparison of measurement data with absolute values of vibration parameters (standards).

The second method:

comparison not with absolute values (standards), but with changes.

The first method comprises:

- comparison of measurement results with standards offered by the MSP or its elements (gearings, bearings, couplings, electric propulsion motors) suppliers;

- comparison of measurement results with RS vibration standards;

- comparison of measurement results with vibration standards in normative documents (branch standards, GOSTs, ISO, etc.).

When the second method is used, comparison deals with the previously set base values of vibration parameters.

Due to inadequate expertise in the assessment of MSP vibration condition, it is recommended to compare the measured value of wide-band vibration with the preset base values.

The general requirements for setting the base values are specified in 4.5.

The factors like MSP operation mode, test conditions (ship's draught, sea state) are of vital importance in vibration measurement. It is important to carry out testing for determination of base values and measurement of current vibration parameters at the same pickup positions and orientation.

Where an essential change is identified in comparing the measured values with the base ones (in the direction of vibration values both increase and decrease), the cause of such change shall be found to prevent the potential failure of the MSP elements.

The change of vibration values by a factor of 2 to 2,5 is considered as essential.

The following actions shall be taken:

- to make sure that any external sources (including other machinery) do not cause change in vibration;

- to repeat measurements;

- to reduce the interval between vibration measurements.

A spectral analysis of vibration shall be used for studying the causes of vibration changes and for detection of malfunctions.

When wide-band vibration measurement shall be supplemented with the analysis of frequency components, the latter is carried out in the same frequency band which is used for determination of wide-band vibration parameters.

6.3.9 Frequency of vibration measurement.

The vibration control associated with the MSP technical condition monitoring system shall be generally carried out every three months.

6.3.10 Results submission.

The information related to MSP and instrumentation in use shall be retained during tests.

The following data shall be recorded:

- name of the MSP manufacturer, as well as MSP type and characteristics including its power, speed, voltage and rated current, serial number, bearings type and their location, propeller characteristics (number of blades, diameter, etc.);

- date and place of tests performance;

- used instrumentation including its model, type and serial number;

- information on instrumentation calibration;

- method of attachment of the vibration pickup;

- MSP modes and operational conditions during tests;

- upper and lower boundaries of the wide-band vibration measurement range;

- measurement points, directions and results;

- norms of permissible vibration values (standards);

- conclusion on test results.

The form of test log recommended is given in Appendix 1.

6.3.11 Calibration.

All the vibration instrumentation shall have valid calibration and verification.

6.4 Shock pulses measurement.

6.4.1 Shock pulses are measured to assess the roller bearing condition and the quality of their lubrication in the MSP elements.

6.4.2 To calculate a base level dB_{inner} , the values n (speed, rpm) and D_{inner} (bearing inner diameter, mm) are entered in instrumentation in measurement.

To control and assess the technical condition of roller bearings, two representative levels of shock pulses having different amplitudes and frequencies (number of pulses per min) are considered:

background level dB_c featuring the oil condition and the general wear of roller bearings (large frequency of low-amplitude pulses);

maximum or peak level dB_m featuring the bearing defect extent (large amplitude of any frequency pulses).

6.4.3 The standards for shock pulses for the various conditions of roller bearings are given in Table 9. The values dB_m and dB_c are determined with respect to the base level dB_{inner} .

6.4.4 The background level of bearing increases ($dB_c > 10$ dB) with lack of lubrication or too tight (loose) fit of the bearing even though the latter has undamaged tracks yet. The amplitudes of peak pulses and the background are rather close ($dB_m = 30$; $dB_c = 20$). Mechanical touching close to the bearing between rotating and immovable parts entails rhythmic (repeating) shock bursts of peak values. The value of shock pulses increases with shaft misalignment.

The bearing condition is assessed for the value dB_m :

$dB_m < 20$ dB = good condition;

$dB_m = 20$ to 40 dB = satisfactory condition;

$dB_m > 40$ dB = poor condition (bearing replacement required).

6.4.5 Special cases for assessment of roller bearings condition.

The above standards correspond to the measurements made with a feeler directly on the bearing housing. In measuring the shock pulses of the directly inaccessible bearings inside damping sleeves, splitted end shields, etc., the technical condition is assessed in two ways.

The first method is based on the fractional increase of the shock pulses level as compared with good bearing condition which level is assumed to be equal to the results of measurements immediately after inspection (bearing replacement).

In this case the increase of the shock pulses level by 20 dB shall be considered as the limiting value.

The second method is based on the above standards allowing for a correction for damping. The correction value (10 to 20 dB) depends on the degree of signal damping in each specific machinery structure and is determined by testing.

6.4.6 Given a high level of shock pulses on the housing of bearings of vortex, wheel and cavitating pumps of any type, it shall be checked whether or not it is the result of hydromechanical phenomena inside the pumps.

For this purpose, the level of shock pulses on the pump body is measured, and if it is less than on the bearing housing, the cause is associated with the bearing.

6.4.7 The points of shock pulses measurement on the MSP are shown in Fig. 1. They are practically coincide with those for vibration measurement.

To monitor the roller bearings condition in hard-to-reach locations, it may be considered fitting special fixed bolts screwed into the bearing body (bearing cap) which allows to pick a signal off a running bearing with an attached sensor.

The measurement of shock pulses for mechanical MSP are carried out on the body in way of the bearings and gearing.

6.5 Temperature monitoring of MSP parts and units.

6.5.1 The heat condition of MSPs and their elements is monitored with the fixed sensors of the temperature of oil and/or propeller shaft bearing housings. The temperature of working media, MSP parts and units is measured with both standard instrumentation and the portable one, i.e. with contact thermocouples and contactless infra-red thermometers.

Table 9

Assessment of roller bearings condition by relation between dB_m and dB_c

Readings on device screen		Potential source of amplified signal		Causes of amplified signal identified after bearing lubrication		
dB_m	dB_c	Readings on bearing housing	Readings on a part adjacent to bearing housing	Readings drop and do not rise	Readings drop, but rise again in several hours	Readings do not drop
> 35	10 to 15	Bearing, oil, loose bearing cap	Other undamaged bearings, mechanical shocks of other parts (coupling, gearing, axial shocks)	Foreign particles in oil	Bearing damage, damage progress control needed	Major bearing damage, disturbance due to loose bearing cap
30	10 to 20	Bearing, oil	Pump cavitation, gearing, coupling	Inadequate lubrication	Inadequate lubrication resulted in bearing damage, damage progress control required	Misadjustment of new bearing, damage of gearing coupling
> 40	25 to 30	Ditto	Ditto	Lack of oil	Ditto	Bearing overloading, pump cavitation, damage of gearing coupling
30 (signal groups in equal time intervals)	< 10	Shaft, body of bearing cap	Shaft, housings and caps of other bearings, gearing, coupling, fan impeller	—	—	Shaft friction on bearings housing or cap, damage of gearing coupling, touching a fan shroud by the fan impeller of an electric propulsion motor
30 (single signals in equal time intervals)	< 10	Impact loads due to machinery work cycle	Impact loads on foundation from other machinery, mechanical shocks due to machinery work cycle, fan impeller	—	—	Mechanical shocks in bearing due to impact loads, damage of gearing coupling, touching a fan shroud by the fan impeller of an electric propulsion motor
About 0	About 0	Causes of readings lack after checking: check power supply and device serviceability, correct selection of measurement points and sensor fitting; measurement is carried out immediately after the surplus lubrication of bearing; bearing center race slides over a shaft; bearing outer race slides in a housing				

6.5.2 The MSP malfunctions identified by the method of temperature monitoring:
overheating (overcooling) of working media (air, water, oil, gas, fuel oil);
overheating of MSP parts and units including hot-spottings;
bearings overheating;
valve leaks in working medium systems, tightness break;
break of heat transfer due to cooled or cooling medium (fluid).

6.6 Detection of malfunctions in examination.

6.6.1 Examinations may be of two types: visual and instrumented, i.e. with optical devices (introscopy).

6.6.2 Examinations are referred to the organoleptic methods of malfunctions detection. For example, the examination of sediment on the parts is termed as minor, average and large which corresponds to three categories of technical condition: A, B and C.

Introscopy implies the examination (if needed, images are recorded) of the MSP internal cavities without dismantling through holes and small hatches using sight pipes with an embedded system for illuminating an observation object in the visible spectrum (0,38 μm to 0,78 μm).

Malfunctions detected with endoscopes on the MSP parts and elements: presence of sediment, wear, cracks, corrosion, scores, scratches, etc.; parts damages; condition of their functional surfaces; damages in places not easily accessible for examination; etc.

6.6.3 As applied to the MSP, endoscopes may be used for examination of:

propeller shaft bearings (podded electric MSP: through standard access holes on a bearing housing; mechanical MSP (in a dock): through small hatches or the magnetic plug of a reduction gear);

seal glands;

condition of the top and bottom reduction gearboxes of mechanical MSPs (through small hatches, blind flanges, magnetic plug);

power shaft bearings, and couplings (for mechanical MSPs);

bearing of MSP turning (reverse);

machinery and arrangements keeping the MSP running (electric propulsion motors, fans, pumps, heat-exchange apparatus, etc.).

7 EXPERIMENTAL PROCEDURES FOR MONITORING OF TECHNICAL CONDITION OF MSP ELEMENTS

7.1 Check of condition of electric propulsion motor of podded electric MSP for vibration level.

7.1.1 The rotor unbalance may be associated with low quality manufacture and poor balancing or caused by damages in operation. The vibration due to unbalance features vibration rate in radial-horizontal direction and is noticeable on rotating frequency f_r . The other malfunctions of electric propulsion motors also appear on that frequency.

7.1.2 Electric propulsion motor-object misalignment. It is noticeable on the frequency $f = kn$, where:

$k = 1$ – basically displacement effect;

$k = 2$ – basically bend effect;

$n = \text{speed, s}^{-1}$.

The bend entails increased axial vibrations.

7.1.3 Malfunctions due to touching.

A frequency of malfunction demonstration:

$$f = Kn$$

where

$K = 1, 2, 3 \dots$

$K = 1$ – for one-point touching;

$K = 2$ – for two-point touching, etc.;

$n = \text{speed, s}^{-1}$.

The vibration is radially directed, non-stable and its level increases after a start.

7.1.4 Roller bearing malfunctions (points 1 and 2 in Fig. 1, Table 9) due to the damage to the bearing cup and center race, solids of revolution, the retainer or caused by poor oil quality are detected in measuring shock pulses.

The standards for shock pulses for various bearing conditions are given in Table 9.

7.1.5 Malfunctions due to stator eccentricity.

The malfunction occurs due to stator deformation during alignment and is caused by a "soft foot", the wear-out of the mounting seat of stator feet due to improper fastening.

The malfunction occurs on the frequency $f = 2f_{supply}$ where f_{supply} is supply frequency.

The vibration amplitude is twice as large as the level of malfunction-free vibration.

7.1.6 Malfunctions due to rotor eccentricity.

The rotor eccentricity results in the occurrence of a rotating variable air gap between the rotor and stator which causes vibration on the second harmonic of the supply frequency ($2f_{supply}$) and the nearest harmonic of the rotor speed.

In addition, the rotor eccentricity initiates vibration on some inherent harmonics with the step of the pole passage frequency $f_p = f_s/2p$ where p is number of poles, f_s is slip frequency. The very harmonic f_p is presented in the spectrum, but its value therewith is limited within 0,6 to 4,0 Hz for two-pole asynchronous motor.

The rotor eccentricity features:

higher vibration on the frequency $2f_{supply}$ (2 to 3 times the eccentricity-free vibration level);

a group of harmonics $\pm f_r$ with the step of the pole passage frequency $f_p = f_s/2p$ around the frequency $2f_{supply}$.

7.1.7 A failure of bars or cracks and chips in rotor end rings, and also improper end rings locking.

In this case several versions of harmonics generation in vibration spectrum are feasible.

The vibration level increases on the rotating frequency f_r , and the side frequencies of the double slip frequency $2f_s$ on both sides of harmonics f_r and, possibly, relative to the second harmonic of the supply frequency $2f_{supply}$ appear.

The inherent harmonics of the supply current double frequency occur on both sides of the harmonics of the bar passage frequency f_{bar} ($f_{bar} = Z_{bar} f_r$), where Z_{bar} is the number of bars.

The bar break may entail the vibration spectrum with the sidebands of the pole passage frequency $f_p = f_s/2p$ on both sides of the rotor rotation frequency f_r and higher-order harmonics $2f_r$, $3f_r$, etc.

7.1.8 Supply phase retardation, breaks and short circuits of wiring of asynchronous motor stator.

The electrical defects of asynchronous motor stator elements generally cause the high vibration level of $2f_{supply}$ frequency.

The retardation of one or two of three supply phases of the asynchronous motor results in large current unbalance between three phases. Such situation is accompanied by a loud noise and a very high level of vibration with the second harmonic frequency $2f_{supply}$ of supply current. In this case, side frequencies at $1/3f_{supply}$ intervals are observed around the frequency $2f_{supply}$ in this spectrum. Unless timely measures on defect elimination are taken, the vibration level of $2f_{supply}$ frequency will exceed 25 mm/s.

7.1.9 The displacement of magnetic axis relative to geometrical axis of rotor brings about huge loads on the drive bearings and coupling and is accompanied by high level of axial vibration on the frequencies f_r and $2f_{supply}$.

7.2 Monitoring of technical condition of MSP turning mechanism.

7.2.1 Depending on the type of drive and auxiliary equipment the following shall be tested:

startability of prime movers;

performance of electric propulsion motors, hydraulic pumps, hydraulic engines and other machinery.

Machinery functioning is tested by their selective (alternating) starting. In so doing, smooth starting, absence of coupling clearances, rigidity of mechanisms fastening on their foundations, absence of leakage on the working surface of hydraulic systems, absence of electric propulsion motor sparking, etc. shall be checked.

The MSP turning mechanism is checked in operation for its intended purpose in compliance with the traditional requirements for rudder and steering gear set forth in the Register rules and guidelines.

7.2.2 The assessment of condition of journal roller (ball) bearing used in MSP turning mechanism is carried out during ship's anchorage in calm water by measuring the position of MSP turning part relative to the fixed one. The measurements are executed with indicating gages in two MSP positions.

Prior to the measurements, it is necessary to make sure that all attachment bolts are in place and torqued as specified in maintenance documentation.

7.2.3 To determine a support (MSP turning bearing) misalignment ϕ , the linear displacements of the opposite points a and b of the support half-cages (refer to Fig. 2) mounted rigidly to the MSP turning part in relation to its crown fitted on the fixed one are subject to measurement.

The linear displacements are determined by difference in the measurements for two MSP positions: with a propeller running ahead and astern and/or PS and SB.

The displacements at each point are measured in the vertical plane with two indicating gages or in another way. The gages are mounted on the support immovable part on tripods along the axis of symmetry and spaced 180° (bow-stern) apart, and equidistantly from the center of rotation of vertical surface of the support half-cages.

The locations for the gage tripods and the places for their ends shall be cleaned of dirt and oil. The gage legs shall be placed vertically with their ends directed upward and rested against the bottom surface of the turning part.

7.2.4 Displacements are determined as an arithmetical mean value by the gage readings obtained from measurements repeated at least twice.

The distance l between the measurement points is determined by the following formula (refer to Fig. 2):

$$l = D + 2\Delta l$$

where D = outer diameter of a half-cage, in mm;
 Δl = distance between a half-cage and a gage leg axis, in mm.

The values l , D and Δl are measured with caliper, metal ruler, tape-measure and triangle. It is preferable to measure the distance l considering the outer diameter D of the support half-cage rings and two distances Δl from the outer vertical wall of half-cages to the gage leg axis.

The distance Δl shall be minimal as appropriate for gage mounting.

7.2.5 The measurement of linear displacements a_i and b_i (refer to Fig. 2) is executed for opposite propeller positions (ahead-astern running).

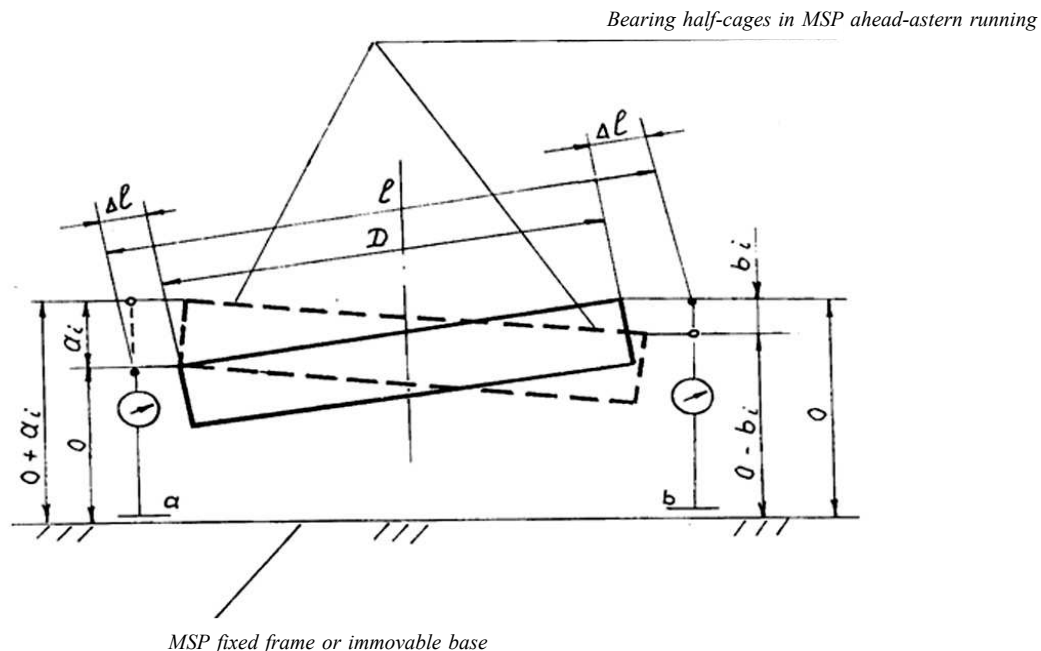


Fig. 2 Diagram for measuring linear displacements of MSP turning bearing half-cages

The misalignment φ is determined by the formula:

$$\varphi = \frac{A + B}{l} \leq 0,004$$

where

$$A = \frac{a_1 + a_i}{i}; \quad B = \frac{b_1 + b_i}{i};$$

arithmetical mean results of displacement measurements by the gages scale;
 i = number of measurements.

7.2.6 The measurement of rotary cages misalignment in relation to the immovable crown is executed to assess the bearing technical condition and the possibility of its further functioning.

The misalignment (due to the technological free play of a support and race wear) $\varphi > 0,004$ is a limiting state for the support and it is not allowed for further use.

7.2.7 Where measurements in operation are impracticable due to bearing inaccessibility, they may be executed during the partial or complete MSP dismantling during repairs or maintenance.

7.3 Check of condition of reduction gears of mechanical MSP for vibration level.

7.3.1 Check of condition of reduction gears for vibration level.

The vibration level of MSP top reduction gear is measured at the following points:

- at reduction gear inlet on the shafting drive side (in way of the bearing);
- on the reduction gear casing in a traverse direction;
- at the output shaft end sternwards.

Vibration is determined by the measurement of vibration rate spectrum in 1/3-octave frequency band within the range of 2 to 1000 Hz at the points shown in Fig. 1.

For mechanical MSP the key unit which vibration may be monitored, is the top reduction gear. In this case, it shall be kept in mind that the vibration of the bottom reduction gear, bearings and propeller interacts with that of the top reduction gear (in the frequency band up to 1000 Hz).

7.3.2 Potential reduction gear malfunctions:

- misalignment with shafting drive on the frequency of its rotation;
- vibration induced by the propeller (on the blade frequency) and the bottom reduction gear (the same frequencies as for the top reduction gear);
- shaft (coupling) beat (on the frequency $2f$ where f is operating rotation frequency);
- unbalance (due to an anti-phase) of reduction gear wheels (pinions);
- damage to reduction gear wheel teeth (on the tooth meshing frequency);
- damage to rolling bearings;
- overheating of reduction gear units (measurement on the casing)

$$T_1 - T_{01} = \Delta T_1$$

where T_1 = temperature at representative point for a serviceable reduction gear;
 T_{01} = ambient temperature.

$$T_{surf} - T_{02} = \Delta T_2$$

where T_{surf} = temperature on the reduction gear surface at a representative point in checking up the condition;
 T_{02} = ambient temperature during measurements.

The tolerable changes in temperature condition $\Delta T_2 - \Delta T_1$ are specified by the reduction gear designer (manufacturer) and monitored in operation with an infra-red thermometer or contact thermocouples.

7.4 Check of condition of mechanism belt drive.

7.4.1 There are generally two kinds of the malfunctions associated with the belt drive:

- extraneous defects affect the drive functioning;
- the very belt has defects.

7.4.2 The first case deals with the belt drive vibration caused by stimulating forces from other sources and, therefore, the belt replacement will not give the result as desired. The sources of such forces are generally the following: the drive system operated under unbalanced conditions; pulley eccentricity; misalignment and loosening of mechanical joints. Thus the vibration analysis shall be carried out for identifying the excitation source prior to belts replacement.

An excitation frequency may be determined with the neon lamp adjusting it so that the belt seems to be motionless in its light.

In case of sectional belt drive, the unequal pull of belts may result in the iteratively enhanced vibration transmitted to the belt drive.

7.4.3 The cases, when the very belts cause vibration, are associated with their physical imperfections: cracks, zones of their hardening and softening, dirt on a belt surface, material broken away from its surface, etc. The width changes of wedge-shaped belts will result in their vertical ranging within the pulley groove giving rise to vibration due to their pull changes.

Where the belt itself causes vibration, the frequencies associated with it are generally the harmonics of the belt rotation frequency. In a specific case, the excitation frequency will depend on the defect character, and also on the number of pulleys including the guide ones.

In some cases, the vibration amplitude may be unstable which is particularly true for a sectional belt drive.

FORM OF TEST LOG

MSP type _____ ship " _____ "

1. General information

Organization performing measurements:	Customer:
Test log No.	
Date:	

2. Particulars of MSP and electric motor

	MSP	Electric motor
Manufacturer		
Model		
Serial number		
Rated power		
Rated speed (rotation frequency)		
Design	<input type="checkbox"/> Z-shaped <input type="checkbox"/> Electric motor	
Number	Shafting bearings: Propeller shaft bearings:	
Connection	<input type="checkbox"/> Reduction gear - coupling <input type="checkbox"/> Direct	

3. Particulars of design**4. Organization (firm) executing MSP repairs or assembly****5. Instrumentation**

Instrumentation type	Manufacturer	Model	Note
Sensor			
Measuring instrument			
Data recorder			
Calibration facilities			

Attachment of vibration pickup	<input type="checkbox"/> threaded <input type="checkbox"/> magnetic <input type="checkbox"/> glued <input type="checkbox"/> manually	
Measured and recorded quantity	<input type="checkbox"/> displacement <input type="checkbox"/> speed <input type="checkbox"/> acceleration	
Measurement range	Amplitude:	Frequency:
Analysis band (filter)	Linear range:	Frequency band:

Power, kW: Speed, rpm:						Ambient air temperature, °C				
Measurement points	Mean-square values of parameters in frequency band of 2 Hz to 1000 Hz in directions									Note
	Longitudinal (x)			Transversal (y)			Vertical (z)			
	s, mm	v, mm/s	a, mm/s ²	s, mm	v, mm/s	a, mm/s ²	s, mm	v, mm/s	a, mm/s ²	

36. REQUIREMENTS FOR MAINTENANCE, REPAIR AND INSPECTION PLANS FOR FIRE PROTECTION SYSTEMS AND APPLIANCES, FIRE SAFETY TRAINING MANUALS, FIRE PLANS AND FIRE SAFETY OPERATIONAL BOOKLETS

1 MAINTENANCE, REPAIR AND INSPECTION PLANS FOR FIRE PROTECTION SYSTEMS AND APPLIANCES (MAINTENANCE PLANS)

Maintenance Plans are to be developed considering the provisions of the Guidelines on Maintenance and Inspection of Fire Protection Systems and Appliances developed by IMO (refer to MSC.1/Circ.1432).

Maintenance Plans are to contain, at least, the following fire protection and fire-fighting systems where installed:

- fire mains, fire pumps and hydrants including hoses, nozzles and international shore connections;
- fixed fire detection systems;
- fixed fire-extinguishing systems and other extinguishing appliances;
- automatic sprinkler, fire detection and fire alarm systems;
- ventilation systems including fire and smoke dampers, fans and their controls;
- emergency shutdown of fuel supply;
- fire doors including their controls;
- general emergency alarm systems;
- emergency escape breathing devices;
- portable fire extinguishing including space charges;
- fire-fighter's outfits.

If the language of the Maintenance Plan is not English, the title sheet is to have the heading of the document in English — "Maintenance Plan for Fire Protection Systems and Appliances".

2 FIRE SAFETY TRAINING MANUALS

Fire Safety Training Manuals are to explain the following in detail:

- general fire safety practice and precautions related to the dangers of smoking, electrical hazards, flammable liquids and similar common shipboard hazards;
- general instructions on fire-fighting activities and fire-fighting procedures including procedures for notification of a fire and use of manually operated call points;
- meanings of the ship's alarms;
- operation and use of fire-fighting systems and appliances;
- operation and use of fire and smoke dampers;
- escape systems and appliances.

Fire Safety Training Manuals are to be in the working language of the ship's personnel. The title sheet is to have the heading of the document in English — "Fire Safety Training Manual".

Fire Safety Training Manuals are to be provided in each crew mess room and recreation room or each crew cabin.

3 FIRE PLANS

The requirements for fire plans are specified in Part VI "Fire Protection" of Rules for the Classification and Construction of Sea-Going Ships.

4 FIRE SAFETY OPERATIONAL BOOKLETS

The Fire Safety Operational Booklet is to contain the necessary information and instructions for the safe operation of the ship and cargo handling operations in relation to fire safety. The Booklet is to include information concerning the crew's responsibilities for the general fire safety of the ship while loading and discharging cargo and while underway. Necessary fire safety precautions for handling general cargoes are to be explained. For ships carrying dangerous goods and flammable bulk cargoes, the Fire Safety Operational Booklet is also to provide reference to the pertinent fire-fighting and emergency cargo handling instructions contained in the International Maritime Solid Bulk Cargoes Code, the International Bulk Chemical Code, the International Gas Carrier Code and the International Maritime Dangerous Goods Code, as appropriate.

Fire Safety Operational Booklets for tankers is to include provisions for preventing fire spread to the cargo area due to ignition of flammable vapours and include procedures of cargo tank gas-purging and/or gas-freeing.

Fire Safety Operational Booklets are to be written in the working language of the ship's personnel. The title sheet is to have the heading of the document in English – "Fire Safety Operational Booklet".

The Fire Safety Operational Booklet is to be provided in each crew mess room and recreation room or each crew cabin.

The Fire Safety Operational Booklet may be combined with the Fire Safety Training Manual.

5 Maintenance, Repair and Inspection Plans for Fire Protection Systems and Appliances, Fire Safety Training Manuals, Fire Plans and Fire Safety Operational Booklets developed by shipowners or on their behalf, if duly authorized, by competent organizations are to be submitted to the Register Head Office or to RS Branch Office for consideration.

37. INSTRUCTIONS FOR SURVEY OF AUTOMATIC AIR PIPE HEADS

1 GENERAL

1.1 Application.

The present Instructions provide survey requirements for automatic air pipe heads installed on the exposed decks of all ships except passenger ships.

Air pipe heads situated in other locations or on passenger ships are to be surveyed according to the requirements of the Register.

1.2 Definitions.

Air pipe heads installed on the exposed decks are those extending above the freeboard deck or superstructure decks.

2 SURVEY REQUIREMENTS

2.1 Air pipe heads are to be externally examined during annual surveys.

In addition, air pipe heads are to be completely examined (both externally and internally) at special surveys as below.

For designs where the inner parts cannot be properly inspected from outside, this is to include removal of the head from the air pipe. Particular attention is to be paid to the condition of the zinc coating in heads constructed from galvanised steel.

The scope of air pipe heads survey is to be as follows:

.1 at the first special survey:

two air pipe heads (one port and one starboard) located on the exposed decks in the forward 0,25L, preferably air pipes serving ballast tanks;

two air pipe heads (one port and one starboard) located on the exposed decks, serving spaces aft of 0,25L, preferably air pipes serving ballast tanks.

The selection of air pipe heads to be inspected is left to the attending Surveyor to the Register.

According to the results of this inspection, the Surveyor may require the inspection of other air pipe heads located on the exposed decks;

.2 at the second special survey:

all air pipe heads located on the exposed decks in the forward 0,25L;

at least 20 per cent of air pipe heads on the exposed decks serving spaces aft of 0,25L, preferably air pipes serving ballast tanks.

The selection of air pipe heads to be inspected is left to the attending Surveyor to the Register.

According to the results of this inspection, the Surveyor may require the inspection of other air pipe heads located on the exposed decks;

.3 from the third special survey:

all air pipe heads located on the exposed decks. Exemption may be considered for air pipe heads where there is substantiated evidence of replacement within the previous five years.

Note. The bracketed periods are only given for information and the details stipulated therein may be omitted.

38. PROCEDURE FOR DIAGNOSING AND DETERMINING THE RESIDUAL LIFETIME OF SILICONE DAMPERS OF MARINE INTERNAL COMBUSTION ENGINES (ICE)

1 GENERAL

1.1 This Procedure is intended for use by the Surveyors to the Register during technical supervision of torsional vibration dampers of marine ICE and recommended for application by laboratories engaged in condition monitoring.

The Procedure contains recommendations on technical supervision, defines the general procedure for performing technical condition monitoring (diagnostics), including the requirements for the scope and content of records based on the results of damper diagnostics.

1.2 The Procedure enables the technical condition of a damper to be assessed by diagnosing, and a forecast to be made of its residual lifetime. This does not preclude the use of alternative diagnosing methods (for example, silicone liquid analysis), or other methods known to be efficient from practice.

1.3 The Procedure for determining the residual lifetime of a damper may be used by laboratories performing damper diagnosis on the basis of the Register Recognition Certificate. This Procedure may be a basis for developing computer programs, drawing up instructions and records in respect of diagnosing of a specific damper model incorporated in installations of a particular ship type.

1.4 The Procedure does not cover spring dampers, since their technical condition is determined on the basis of the extent of the spring (spring pack) wear, which can be visually ascertained when the damper is dismantled during maintenance within the time period specified in the engine (or damper) operation manual. The availability of such damper can be restored by replacement of the pack, or by renewal of the worn springs without any additional tests being carried out.

2 TECHNICAL SUPERVISION OF DAMPERS IN OPERATION

2.1 Inspection of damper technical condition.

2.1.1 The technical condition of a damper is to be checked by the shipowner within the timeframe corresponding to the service life specified by the damper Manufacturer, as per manual.

2.1.2 Where there is no information regarding the frequency of technical condition checks of a damper specified by the Manufacturer, the damper service life is to be assumed in accordance with the requirements of 2.4.5.4.1.9, Part II "Carrying out Classification Survey of Ship" of the Guidelines" of the Rules.

2.1.3 A damper can be required to undergo technical condition inspection on the basis of the following:

- .1** a damper is used beyond the specified or previously determined residual service life;
- .2** an inspection is due as per Manufacturer's manual or as per the requirements of 2.1.2;
- .3** replacement of the existing damper by a new one having different parameters, or by a damper of the same model, which has been restored without the participation of the Manufacturer.

2.1.4 In some cases, inspection at special survey can be required of a damper, which is known (has been identified) from service experience of a sister ship (similar installation) to be of low reliability in a given type of installation.

2.2 Measures to maintain damper availability.

2.2.1 If inspection of a damper's technical condition has been required under 2.1.3 or 2.1.4, the shipowner is to take one of the following steps:

- .1** damper diagnosing (torsional vibration measurements);
- .2** liquid sampling and analysis;

.3 investigate possibility of operating dampers in this ship while increasing the frequency of inspections, or without limiting their service life (without any additional inspections being carried out);

.4 replace the existing damper by a new one having the same parameters (which is to be documented), without diagnosing;

.5 renew the liquid taking care that the new liquid has the same characteristics (without analysis).

2.3 Damper diagnosing procedure.

2.3.1 Damper diagnosing is carried out on the basis of requests from shipowners by laboratories having Recognition Certificates issued by the Register.

2.3.2 The laboratory develops and agrees with the Register a damper diagnosing program which includes information on reference values of diagnostic parameters.

2.3.3 The Laboratory performs damper diagnosing in accordance with the approved program, draws up a diagnosing report and, having agreed it with the Register Branch Office, sends it to the shipowner.

2.3.4 Copies of damper diagnosing reports approved by Register Branch Offices, or combined annual reports containing inspection results, are sent to the Register Head Office for entry in the database, review and refining of normative documents.

2.4 Damper diagnosing documentation.

2.4.1 The following documentation is to be developed in performance of work in accordance with the requirements of 2.3:

.1 damper diagnosing program;

.2 damper diagnosing report.

2.4.2 Damper diagnosing program is developed for the ship type under consideration in accordance with Section 6, and it is to be approved by the Register prior to the commencement of the diagnosing.

2.4.3 The program is to contain information on reference and permissible diagnostic parameters established on the basis of recommendations set out in Section 3.

2.4.4 Damper diagnosing report is drawn up based on the results of diagnosing on board a specific ship in accordance with the program, and it is to be approved by the Register. Tentative report contents are set out in Section 7.

3 GUIDELINES ON SUBSTANTIATING OF REFERENCE AND PERMISSIBLE VALUES OF DIAGNOSTIC PARAMETERS

3.1 Substantiating of values of reference diagnostic parameters.

3.1.1 The frequencies and amplitudes of such torsional vibration modes for whose damping the damper is set are to be taken as diagnostic parameters for the assessment of damper technical condition.

These generally include natural vibrations of motor mode, which can be identified on the basis of the following:

.1 in propulsion plants where shafting and/or elastic coupling of great flexibility (flexibility is 10 times that of crankshaft crank) is provided behind the engine flywheel, the motor mode is practically identical with the one-nodal vibration mode for the portion of the gyrating mass system "damper – crankcase – flywheel" with the remaining part behind the wheel disregarded;

.2 if the engine flywheel is connected with a consumer mass (for example, a generator armature) by a "rigid" shaft, the vibration motor mode will correspond to the one-nodal mode of natural vibrations of this simple gyrating mass system.

3.1.2 Among the reference values are the values of the following diagnostic parameters of motor mode vibrations determined subject to the condition that the damper is properly functioning:

.1 natural frequencies N_{mref} in rpm;

.2 crankshaft resonance speed n_{vref} in rpm, which falls within the range of revolutions from minimum stable to $1,2n_{rated}$ (where n_{rated} is rated engine speed, rpm) and is excited by the most significant disturbing moment of v -th order;

.3 amplitude of the harmonic component of torsional vibration A_{vref} , rad, and stresses therefrom τ_{vref} , MPa, at resonance speed (see 3.1.2.2);

.4 total amplitude $A_{\Sigma ref}$, rad, from forced (near-resonance) torsional vibration at rated speed or stresses therefrom $\tau_{\Sigma ref}$, MPa (for those types of ships where, on the basis of calculation results, the values of such vibration approximate permissible values).

3.1.3 The values of reference diagnostic parameters may be determined for the engines under consideration, which have a properly functioning and well adjusted damper, by one of the following methods:

.1 previously performed torsional vibration calculation for the gyrating mass system under consideration (for prototype/upgraded ship of the design);

.2 calculation of motor mode vibration for the portion of the gyrating mass system referred to in 3.1.1;

.3 the results of the shafting torsional vibration measurements for a prototype (sister) ship having a properly functioning damper;

.4 satisfactory results of previously performed torsional vibration measurements for this ship's shafting with a properly functioning damper;

.5 statistical analysis of the results of torsional vibration measurements for shafting in sister ships' installations, with varying service time of engines having properly functioning dampers.

3.1.4 The statistical analysis under 3.1.3.5 is carried out according to the following procedure:

.1 diagnostic parameters value selection is carried out in accordance with 3.1.2 (without regard to the results of torsional vibration measurements of engines with defective dampers);

.2 mathematical expectation and coefficient of parameter variation are calculated by Formulas (4.4.3-1) to (4.4.3-6);

.3 the mathematical expectation is taken as the reference parameter;

.4 the calculations are performed in tabular form (see Table 6.8).

3.1.5 Prior to the performance of specific tests, the reference amplitude for the rated speed under 3.1.2.4 may be assumed to a first approximation to be equal to the permissible amplitude determined by Formula (3.2.1.1).

After sufficient information has been gathered, the reference amplitude is to be determined by statistical analysis. The permissible stresses under the Register rules may be somewhat exceeded (by no more than 20 per cent) pending amendment of the formulas for the calculation of permissible stresses due to crankshaft torsional vibration.

3.2 Substantiating of permissible diagnostic parameters.

3.2.1 Permissible diagnostic parameters include the following values:

.1 permissible stresses τ_{vperm} , MPa, at resonance speeds n_v , in rpm, determined on the basis of the Register rules, or an equivalent parameter – permissible amplitude A_{vperm} , in rad, determined by the formula

$$A_{vperm} = \frac{\tau_{vperm}}{[\tau/A]}, \quad (3.2.1.1)$$

.2 permissible stresses $\tau_{n.perm}$, MPa, at rated speed n_{rated} , rpm, determined on the basis of the Register rules, or an equivalent parameter – permissible amplitude $A_{n.perm}$, in rad, determined by the formula

$$A_{n.perm} = \frac{\tau_{n.perm}}{[\tau/A]}, \quad (3.2.1.2)$$

.3 permissible deviation α_k , in per cent, of k -th actual diagnostic parameter from its reference value, which characterizes natural parameter spread that is not related to the deterioration of the damper's technical condition.

3.2.2 For the purpose of substantiating diagnostic parameters, the following values of permissible deviations are recommended:

.1 for frequency of motor mode natural vibrations: $\alpha_N = 3$ per cent;

.2 for resonance vibration amplitudes: $\alpha_A = 5$ per cent;

.3 for stresses due to resonance vibration: $\alpha\tau = 5$ per cent.

3.2.3 The upper confidence bound K_u and the lower confidence bound K_l of permissible deviation of diagnostic parameter are determined by the formulas:

$$K_u = K(1 + \alpha_k/100); \quad (3.2.3-1)$$

$$K_l = K(1 - \alpha_k/100). \quad (3.2.3-2)$$

4 GUIDELINES ON DIAGNOSING

4.1 General provisions for diagnosing.

4.1.1 The purpose of diagnosing is to assess the technical condition of a damper and its residual service life till next survey at which performance of next torsional vibration measurements will be advisable.

4.1.2 Diagnosing is performed according to a program, which is to comprise:

- .1 information on reference and permissible values of diagnostic parameters (see Section 3);
- .2 guidance on performance of preparatory, main and final jobs, to be developed on the basis of this section.

4.1.3 Damper diagnosing is to be performed having regard to its actual service time from the beginning of operation, and from the time of the previous torsional vibration measurements (if any).

4.1.4 Torsional vibration measurements are to be performed by equipment having such characteristics as to allow recording of diagnostic parameters of a given type of installation in all the ranges under consideration, which has passed the necessary metrological examination and has been calibrated in accordance with the equipment operation manual.

4.1.5 It is desirable that repeated torsional vibration measurements be carried out on board one and the same ship under the same conditions of engine operation and torsional vibration recording. Normally, the same means and methods for the measurement and processing of torsional vibration records are to be used.

4.2 Preparatory work for damper diagnosing on board.

4.2.1 Prior to the commencement of diagnosing, specific construction features of the engine and damper are to be detailed and compared to the parameters serving as a basis for the torsional vibration calculation of gyrating mass system for this type of ship. Particular consideration is to be given to the following:

- .1 flywheel dimensions, construction and material of piston and crankshaft, presence of crankshaft balance weights, damper model;
- .2 check of engine and damper technical condition and operating conditions;
- .3 external defects and damage to damper, as well as tightening of damper threaded connections.

4.2.2 The following data are to be identified from ship documentation:

- .1 damper service time from the beginning of operation, from the last repairs, and from the previous torsional vibration measurements;
- .2 repairs or upgrades of damper and engine.

4.2.3 In order to enhance the accuracy and validity of torsional vibration measurements results, it is necessary to ensure that the engine and its components shall be in good technical condition prior to the commencement of tests.

Particular attention is to be paid to tightening of threaded connections of rotating components and adjusting of fuel equipment so that the gas pressure variation among cylinders is within permissible limits.

4.2.4 The torsional vibration sensor is to be fitted on the front end of the crankshaft (at damper casing). The frequency response of the torsional vibration sensor with its attachment to the tested item is to be adjusted to allow undistorted recording of the examined resonance frequencies.

4.2.5 Prior to the commencement of tests, the sequence of operations is to be agreed with the ship's crew to achieve the power installation operating conditions required during torsional vibration measurements.

4.3 Torsional vibration measurements performance.

4.3.1 Engine operating modes during torsional vibration measurements are selected having regard to the following:

.1 the principal condition for the selection of operating modes is to ensure that consecutive torsional vibration measurements on board one and the same ship are performed under the same load and engine operating modes;

.2 for diagnosing purposes, selection of one engine operating mode to achieve minimum testing duration is permitted (for example, engine testing with the ship moored for ships with FPP).

4.3.2 In order to enhance the accuracy and validity of torsional vibration measurements results, the following is recommended:

.1 make the first torsional vibration recording while continually raising and lowering the speed over the whole range;

.2 undertake preliminary processing of torsional vibration records and specify the portions with the recording of expected resonance vibrations of motor mode;

.3 make torsional vibration recording in the areas of resonance vibration of motor mode while raising and lowering the speed in steps or as slowly as possible, to be repeated not less than 3 times;

.4 make a torsional vibration recording at rated speed 3 times with a pause of not less than 2 min.

4.3.3 When performing torsional vibration measurements, optimum vibration record scanning speed is to be set to enable computing of vibration frequency with minimum consumption of the recording medium (audiotape, photofilm, paper tape, etc.).

4.4 Recommendations for the processing of torsional vibration measurements.

4.4.1 The following diagnostic parameters are to be identified after the processing (deciphering) of torsional vibration records:

.1 actual resonance speed n_{vact} for v -th vibration order;

.2 actual frequency of motor mode vibration $N_{mact} = vn_{vact}$;

.3 actual vibration amplitude A_{vact} at resonance speeds for the selected order;

.4 actual total amplitude $A_{\Sigma act}$ and spectral distribution of torsional vibration at rated speed.

4.4.2 In order to ensure maximum accuracy and validity of the above-mentioned diagnostic parameters, harmonic analysis of relevant portions of torsional vibration records is to be conducted subject to the following conditions:

.1 for simple gyrating mass systems, harmonic analysis can be performed manually, with the recording extended as necessary to enable more accurate plotting of envelope curves and measuring of amplitudes;

.2 for complex gyrating mass systems, computer-aided spectral analysis is to be performed using special programs, filters and analyzers to enable more accurate assessment of parameters of harmonic components of the recorded vibration;

.3 the analysis is performed on the portions of torsional vibration records containing recording of an integer number of full vibration cycles (multiple of two revolutions for four-stroke engines, and of one revolution for two-stroke engines);

.4 analysis of recordings of identical vibrations is to be performed at least six times (three times at speed lowering and three times at speed increasing).

4.4.3 Upon sampling of frequency and amplitude as per 4.4.2.4, assessment is to be performed of their mathematical expectation x_{exp} and coefficient of variation V , as well as calculation error δ and confidence bounds x_l by the following formulas:

$$x_0 = \frac{\sum_{i=1}^m x_i}{m} ; \quad (4.4.3-1)$$

$$V = \frac{1}{x_0} \sqrt{\frac{\sum_{i=1}^m x_i^2 - mx_0^2}{m-1}} ; \quad (4.4.3-2)$$

$$\delta = \frac{v}{\sqrt{m}}; \quad (4.4.3-3)$$

$$x_l^0 = (1+d)x_0; \quad (4.4.3-4)$$

$$x_u^0 = (1-d)x_0 \quad (4.4.3-5)$$

where x_i is the i -th sampling term of the examined random value (frequency or amplitude);
 m is the extent of sampling.

Mathematical expectations of amplitude and frequency of resonance vibration of motor mode are to be assumed as desired values. The calculation error δ is not to exceed $\delta_{perm}=0,1$. Where this condition is not fulfilled, several other portions of torsional vibration records with similar measurements are to be processed to increase the extent of sampling to a value m determined by the formula

$$m = \left(\frac{V}{\delta_{perm}} \right)^2, \quad (4.4.3-6)$$

and the calculations given above are to be repeated for the new sampling.

5 ASSESSMENT OF THE TECHNICAL CONDITION AND RESIDUAL SERVICE LIFE OF A DAMPER

5.1 General.

5.1.1 Assessment of the technical condition of a damper is performed by comparing actual values of diagnostic parameters obtained from the processing of torsional vibration records with reference and permissible values of the same parameters.

5.1.2 When determining the technical condition of a damper, consideration is to be given to the level of reliability of similar dampers having regard to the available information on failures. For these purposes, the term "failure" means an occurrence connected both with the identification of damper defects during fault detection, and with diagnostic parameters exceeding permissible limits during torsional vibration measurements.

5.1.3 The reliability level is determined on the basis of the following criteria (as the information on failures is accumulated, a damper's reliability level can be reconsidered):

.1 those engines have a low reliability level whose dampers had failures within a service period not exceeding the specified service life (see 2.1.1 and 2.1.2);

.2 those engines have a normal reliability level whose dampers had no failures within a service period exceeding the specified service life;

.3 those engines have a high reliability level whose dampers had no failures throughout the whole service period and/or those engines in whose crankshaft torsional vibration stresses do not exceed half the permissible values over the whole speed range, even in the event of partial loss of damping properties.

5.2 Initial data for determining the residual service life and assessment of damper technical condition.

5.2.1 The following initial data are necessary for carrying out calculations to assess the residual service life and technical condition of a damper, obtained by the methods mentioned above:

.1 service life specified by the firm, R_{sp} . If unknown, R_{sp} can be assumed to be equal to 30000 hrs;

.2 reference stresses τ_{vref} and amplitude A_{vref} at resonance under consideration;

.3 reference total amplitude $A_{\Sigma ref}$ at rated speed;

.4 permissible stresses τ_{vperm} and amplitude A_{vperm} at resonance under consideration;

.5 permissible stresses $\tau_{n.perm}$ and amplitude $A_{n.perm}$ at n_{rated} ;

.6 actual stresses τ_{vact} and amplitude A_{vact} at resonance under consideration;

.7 actual total vibration amplitude $A_{\Sigma act}$ at rated speed;

.8 reference frequency of motor mode natural vibrations $N_{mref}=vn_{vref}$ at resonance in question;

.9 actual frequency of motor mode natural vibrations N_{mact} at resonance in question;

.10 confidence bounds coefficient for assessment of stresses α . In the absence of results of special research into this value as per 6.4, α can be assumed to be equal to 0,10;

.11 permissible limits coefficient for assessment of frequencies β (recommended value $\beta = 0,05$);

.12 engine service time per voyage S_{voyage} and engine service time per calendar year S_{year} .

5.3 Assessment of the residual service life and technical condition of a damper.

5.3.1 Assessment of the residual service life and technical condition of a damper on the basis of the above-mentioned initial data consists of the following operations:

.1 reducing diagnostic parameters to dimensionless form;

.2 determination of damper technical condition coefficients by resonance vibration stresses;

.3 determination of variation coefficient for damper moment of inertia by resonance vibration frequency;

.4 determination of damper reliability coefficient;

.5 determination of residual lifetime and technical condition of damper;

.6 drawing up of conclusion on damper technical condition and recommendations for its further operation.

5.3.2 Resonance vibration diagnostic parameters are reduced to dimensionless form by the following formulas:

.1 relative reference stresses or amplitude at resonance under consideration:

$$D_{ref} = \tau_{vref} / \tau_{vperm} = A_{vref} / A_{vperm}; \quad (5.3.2.1)$$

.2 relative permissible stresses or amplitude at resonance under consideration:

$$D_{perm} = \tau_{vperm} / \tau_{vperm} = A_{vperm} / A_{vperm} = 1; \quad (5.3.2.2)$$

.3 relative actual stresses or amplitude at resonance under consideration:

$$D_{act} = \tau_{vact} / \tau_{vperm} = A_{vact} / A_{vperm}; \quad (5.3.2.3)$$

.4 deviation coefficient of actual frequency N_{act} from the reference value N_{ref} :

$$K_N = N_{vact} / N_{vref}. \quad (5.3.2.4)$$

5.3.3 Damper technical condition coefficients by stresses and natural frequency are determined by the following formulas:

.1 damper technical condition coefficient by stresses K_t is determined by the formula

$$K_t = \frac{D_{perm} - D_{act}}{D_{act} - D_{ref}}, \quad (5.3.3.1)$$

subject to the restrictions mentioned in 5.3.3.2 to 5.3.3.4;

.2 if actual stresses do not exceed the upper confidence bound, which corresponds to the condition

$$(1 + \alpha) D_{act} - D_{ref} \leq \alpha, \quad (5.3.3.2)$$

then $K_t = 1$ is to be taken;

.3 if actual stresses are equal to or exceed permissible stresses, which corresponds to the condition

$$D_{act} \geq D_{perm}, \quad (5.3.3.3)$$

then $K_t = 0$ is to be taken;

.4 if actual stresses lie within the range between the reference and permissible stresses, which corresponds to the condition

$$D_{perm} > D_{act} > D_{ref}, \quad (5.3.3.4)$$

then $K_t = 1$ is to be taken where $K_t > 1$, and the calculation value K_t from the Formula (5.3.3.1) is to be taken where $K_t \leq 1$.

5.3.4 In order to verify the degree of deterioration of damper technical condition due to variation of its moment of inertia, coefficient of variation of damper moment of inertia K_{mid} is to be determined by comparing coefficient K_N determined by the Formula (5.3.2-4) with confidence bounds $(1 + \beta)$ and $(1 - \beta)$.

If the coefficient K_N does not exceed the confidence bounds, which corresponds to the condition

$$(1 - \beta) \leq K_N \leq (1 + \beta), \quad (5.3.4)$$

then $K_{mid} = 1$ is to be taken.

Alternatively, in the case where assumption is made about the impairment of damper technical condition and about variation of its moment of inertia, the value $K_{mid} = 0,5$ is to be taken.

The condition $K_N > (1 + \beta)$ suggests a decrease in the moment of inertia (possibly due to oil leakage from damper casing), and $K_N < (1 - \beta)$ suggests its increase compared to the moment of inertia of a fit damper due to flywheel jam.

5.3.5 In order to register the reliability level of a damper, the coefficient K_{rel} is to be determined, the value of which may be as follows:

.1 $K_{rel} = 0$ – for an impermissible level of reliability which is assumed, irrespective of the results of calculation of coefficients K_t and K_N , in the following cases:

detection of mechanical damage to damper (silicone liquid leakage, casing deformation, breaking of fastening components, etc.);

when the total vibration amplitude for the rated speed achieves the value $A_{\Sigma act} > 1,3A_{n,perm}$;

.2 $K_{rel} = 0,25$ – for a low reliability level determined on the basis of the criteria set out in 5.1.3.1, and when total vibration amplitude for the rated speed achieves the value $A_{\Sigma ref} < A_{\Sigma act} \leq 1,3A_{n,perm}$;

.3 $K_{rel} = 0,5$ – for a normal reliability level determined on the basis of the criteria set out in 5.1.3.2 provided that the total vibration amplitude $A_{\Sigma act} \leq A_{\Sigma ref}$ at rated speed;

.4 $K_{rel} = 1$ – for a high reliability level determined on the basis of the criteria set out in 5.1.3.3, provided that $K_t = 1$ and $A_{\Sigma act} \leq 0,5A_{n,perm}$. Otherwise, the damper is to be downgraded in accordance with the guidelines set out in 5.3.5.1 to 5.3.5.3.

5.3.6 Damper residual service life R_{res} is determined by the formula

$$R_{res} = K_t K_{mid} K_{rel} R_{sp}. \quad (5.3.6)$$

5.3.7 Overall assessment of damper technical condition is carried out using coefficients of conformity of the residual service life with the engine service time per voyage K_{voyage} and during the periods between the annual K_{an} and special K_{sp} surveys, determined by the following formulas:

$$K_{voyage} = R_{res} / S_{voyage}; \quad (5.3.7-1)$$

$$K_{an} = R_{res} / S_{year}; \quad (5.3.7-2)$$

$$K_{sp} = R_{res} / 4S_{year}. \quad (5.3.7-3)$$

By rounding the obtained values to the nearest integer, the number of voyages n_{voyage} and of years n_{year} is achieved, throughout which the engine can operate till next damper diagnosing.

5.3.8 On the basis of the values of the residual service life conformity coefficient, a conclusion on overall damper technical condition may be formulated using the following tests:

.1 the condition $K_{voyage} < 1$ (including $K_{rel} = 0$) corresponds to poor technical condition of damper, wherein the damper is to be replaced or repaired having regard to flaw detection results and analysis of silicone liquid quality;

.2 the condition $K_{voyage} \leq 1$ where $K_{year} < 2$ corresponds to satisfactory technical condition of damper, wherein damper operation may be permitted throughout several voyages till next diagnosing after running not more than one period of ship annual survey;

.3 the condition $K_{year} \leq 2$ where $K_{sp} < 1$ corresponds to good technical condition of damper, wherein the damper operation may be permitted till next diagnosing after running not less than two periods of ship annual survey;

.4 the condition $K_{sp} \geq 1$ corresponds to reference (corresponding to a new product) technical condition of damper, wherein the damper operation may be permitted till diagnosing after running not less than one period of ship special survey.

5.3.9 If diagnosing results are unsatisfactory (see 5.3.8.1), a decision is to be made to replace the damper in question with a fit one (new or renewed) or repair the damper in question.

5.3.10 If the results of torsional vibration measurements are unsatisfactory, and fulfillment of the requirement of 5.3.9 is impossible due to various reasons, the Register may accept the results with the assignment of restricted speed ranges subject to the following:

.1 actual stresses are not to exceed permissible stresses by more than 30 per cent;

.2 the restricted range is not to restrict operation at rated speed and other crankshaft working speeds where the engine operates most of the time.

6 DIAGNOSING PROGRAM¹

6.1 General:

.1 procedure for carrying out preparatory, main and final diagnosing operations for torsional vibration damper of main (auxiliary) engine of ships of this type (design);

.2 reason for carrying out the job (state cause, for example, a damper is in service beyond the period specified by the firm/Register);

.3 job purpose (assessment of damper technical condition and deciding whether it may be further operated, and how long). If damper diagnosing is performed simultaneously with torsional vibration measurements for other purposes (for example, for checking of the efficiency of elastic couplings), then this program is to be incorporated into the overall program;

.4 information on Register recognition of the job performer;

.5 conclusion based on the results of diagnosing in accordance with the requirements of the Procedure.

6.2 Characteristics of the item of examination:

.1 shipowner (name);

.2 design number or ship type (for example, design 503 or ship of ALPINIST type);

.3 composition of propulsions (auxiliary) plant (state type or model of each component): main (auxiliary) engine, damper, coupling (elastic, disengaging), main and distributing reduction gear, intermediate shaft, controllable pitch mechanism, propeller shaft, propeller, shaft-driven generator, etc. (additional plant particulars are to be stated where necessary);

.4 variants of connection and switching of plant components;

¹ Tentative contents. Depending on the plant composition and operating modes, the extent of diagnosing may be decreased.

.5 main engine particulars:

Type, model

Combustion cycle

Configuration In-line/V

Cylinder number 8

Bore, mm 320

Stroke, mm 480

Rated power, kW 1020

Rated speed, min^{-1} 428;**.6 main engine (plant) operating modes. To be given in tabular form.****6.3 Torsional vibration diagnostic parameters:****.1** specified service life of damper;**.2** damper reliability category;**.3** gyrating mass system of the whole propulsion plant (simple/complex);**.4** method for defining reference parameters;**.5** reference and permissible parameters of motor mode torsional vibration (see Table 6.3.5).

Table 6.3.5

Parameters	Resonance of n -th order		Forced vibration of n -th orders at rated speed	
	reference	permissible	reference	permitted by the Register
n , rpm N , order A , rad τ , MPa				

6.4 Measuring equipment.

The measuring equipment comprises:

.1 composition, type, manufacturer, works number;**.2** signal processing method;**.3** fastening method and place of sensor connection (description/sketch);**.4** method of registration of engines speed and place of sensors connection.**6.5 Diagnosing preparatory stage.**

The list of main preparatory operations is given in Table 6.5.

Table 6.5

Nos	Operation	Performers
1	Sensor mounting sketch preparation	Laboratory
2	Manufacture and mounting of sensor fastening appliances, with systems dismantling, according to laboratory sketches	Customer
3	Connection to power supply equipment of required quality	Customer
4	Heat control and adjustment of engine by cylinder gas pressure in accordance with Manufacturer's operation manual	Customer and laboratory
5	External examination (flaw detection), check and restoration of fastening of rotating shafting components	Customer and laboratory
6	Mounting of sensor on engine and installation of measuring system circuit	Laboratory
7	Calibration and gaging of equipment as per operation manual	Laboratory
8	Briefing of ship's crew in testing procedure	Laboratory
9	Trial starts for equipment adjustment and crew training	Laboratory and crew

6.6 Main diagnosing stage.

6.6.1 If no torsional vibration measurements in full are required at all plant operating modes for damper diagnosing, a brief substantiation is to be given. The basic requirement is that repeated measurements be carried out at the same engine operating modes for which reference parameters were obtained.

6.6.2 Selection of plant operating mode (modes) for diagnosing having regard to 6.6.1 (to be listed with indication of recording purposes and specifics at each mode).

6.6.3 Upon completion of torsional vibration measurements, laboratory experts are to carry out review and analysis of torsional vibration records at each mode. Where low recording quality is detected, the cause for defects is to be identified and eliminated, and the recording repeated at the same mode.

6.7 Final diagnosing stage.

6.7.1 The final diagnosing stage is carried out at the laboratory and consists of the following operations:

.1 harmonic analysis of the recorded vibration and determining of actual diagnostic parameters – natural frequencies and resonance amplitude frequencies of motor mode torsional vibration;

.2 determining of stresses due to torsional vibration at resonance and rated crankshaft speeds;

.3 assessment of damper technical condition and residual service life;

.4 assessment of probable causes for deterioration of damper technical condition (where necessary).

6.7.2 The harmonic analysis determines actual motor mode natural frequencies, the amplitude of the resonance vibration under consideration and the stress value.

6.7.3 If actual natural frequencies differ from the rated frequencies by more than 5 per cent, correction of engine gyrating mass system is to be done by varying the damper parameters.

6.7.4 Assessment of damper technical condition and residual service life, as well as assessment of probable causes for deterioration of damper technical condition is to be carried out on the basis of the Procedure provisions.

6.8 Substantiation of reference parameters.

The determination method is to be specified; the data are to be presented in tabular form (see Table 6.8)

Table 6.8

Document (name, number)	Parameters of resonance motor mode vibration of n -th order			Forced vibration amplitude, n_{rated} , rpm
	n , rpm	stresses, MPa	vibration frequency, order	
1				
...				
n -th				

The calculations are carried out in accordance with 3.1.4.

6.9 Requirements for damper diagnosing records

6.9.1 The diagnosing results under this program are documented as a Damper Diagnosing Report (hereinafter referred to as the Report), which is to contain the following data: name of laboratory, reference to laboratory Recognition Certificate issued by the Register, family names of performers, date of tests performance, name and side number of ship, information on conformity of the work performed with the requirements of this program, test performance conditions (ship operating mode and torsional vibration measurements modes), equipment used, method of registration and processing of torsional vibration records, sample torsional vibration records at resonance and rated speeds, summary table of actual, reference and permissible diagnostic parameters and relevant diagram relating vibration amplitude to the number of revolutions, results of assessment of damper technical condition and residual service life, conclusions and recommendations.

6.9.2 The Report is to be drawn up by the laboratory on A4 format sheets to the extent of three – five pages, and it is to be agreed within one month from the date of conclusion of tests.

6.9.3 A preliminary conclusion on the basis of prompt records processing is to be drawn up by the laboratory and agreed with the Register Branch Office within three days from the diagnosing date.

7 DAMPER DIAGNOSING REPORT (TENTATIVE CONTENTS)

7.1 General information:

- .1** name of laboratory;
- .2** Recognition Certificate, period of validity;
- .3** date and place of tests;
- .4** family names and positions of performers;
- .5** item of research (ship, shipowner, main/auxiliary¹ engine, type, model);
- .6** engine (damper) service time from the beginning of operation (from replacement/repair¹);
- .7** reason for carrying out diagnosing (expiration of service life), diagnosing purpose (testing of availability of main engine silicone damper by torsional vibration measurements);
- .8** information on diagnosing program (name, number, Register approval);
- .9** information on torsional vibration measurements (first, repeated, after repairs, etc.);
- .10** information on shafting torsional vibration calculation (name, number, date, performer);
- .11** reference to the source of reference parameters (for example, from diagnosing program).

7.2 Torsional vibration measurements modes:

- .1** state modes (in accordance with program) or substantiate deviations.

7.3 Equipment used and measurement results processing methods:

- .1** the information is to be given similar to 6.4, or a reference to the diagnosing program.

7.4 Torsional vibration measurements results.

7.4.1 Sample torsional vibration records recorded at resonance and rated speeds as well as their processing results over the whole working speed range are to be given in the quantity necessary for confirming fulfillment of the Report purposes.

7.4.2 Based on torsional vibration records processing results, vibration (stress) amplitude development chart is to be given based on the crankshaft speed (see Fig. 7.4.2).

7.4.3 Selected data on main diagnostic parameters needed to assess the technical condition of a damper may be given in tabular form (see Table 7.4.3).

7.5 Assessment of the technical condition and residual service life of a damper.

Assessment of the technical condition and residual service life of a damper may be performed on a computer using a special program developed in accordance with this Procedure. A copy of the residual service life calculation is to be attached to the Report.

7.6 Conclusions and recommendations (tentative form).

The measurements and flaw detection performed on the damper have produced the following results:

- .1** damper reliability conforms to category _____ (state reliability level);
- .2** damper technical condition is satisfactory/unsatisfactory¹;
- .3** estimated residual service life is _____ hrs.

The damper under consideration may be operated for a period of _____ hrs until next diagnosing, which corresponds to _____ voyages (average voyage duration is taken as _____ hrs) or _____ annual survey periods).

Note. The information in brackets is for reference purposes and may be omitted.

¹ Delete as appropriate.

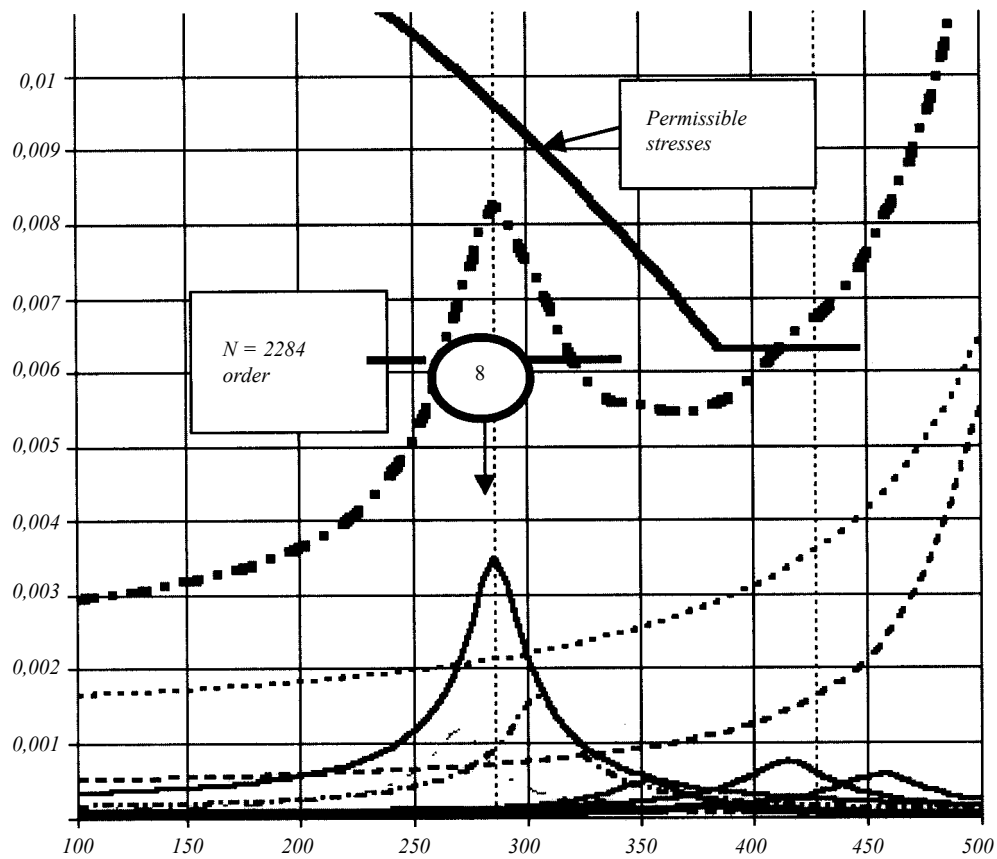


Fig. 7.4.2
Vibration amplitude development chart (example)

Table 7.4.3

Parameters	Resonance of n -th order			Forced vibration of n -th orders at rated speed		
	actual	reference	permissible	actual	reference	permitted
n , rpm N , order A , rad τ , MPa						

39. GUIDELINES FOR USE OF REMOTE INSPECTION TECHNIQUES FOR SURVEYS OF SHIP AND OFFSHORE INSTALLATIONS

1 GENERAL

1.1 Basic requirements for use of remote inspection techniques for surveys of ships and offshore installations are given in Section 4, Part I "General Provisions" of the Rules, 2.5.8, Part II "Survey Schedule and Scope" of the Rules, Section 19, Part III "Additional surveys of ships depending on their purpose and hull material" of the Rules, Section 9, Part II "Carrying Out Classification Surveys of Ships" of the Guideline.

1.2 When allowed by the Rules, remote inspection technique may be used to facilitate the required external and internal examinations, including close-up surveys and gauging. The methods applied for remote inspection technique shall provide the survey results normally obtained for/by the RS Surveyor as a result of the survey by conventional methods. Such a survey shall be carried out in compliance with a Plan of examinations agreed by RS and developed in accordance with 1.3, and in the presence of the RS Surveyor.

1.3 Plan of examination of an object using remote inspection techniques shall be submitted in advance to RS (refer to 1.1) by shipowner or his authorized representative for review and acceptance of possibility to carry out such a survey, but not later than 1 month prior to the commencement of the survey where such techniques will be used. Plan of examination shall at least contain the following:

- overall information on object to be examined;
- scope of surveys using remote inspection techniques, including confirmatory surveys/close-up surveys/gauging;
- description, technical particulars and methodology of using remote inspection techniques;
- information about the organization, which will use remote inspection techniques to carry out the examination of the objects (name of organization, experience in the field claimed, the availability of the Recognition Certificates of RS and/or another recognized organizations (depending on the type of work performed (refer to Section 7 of Part I "General Provisions" of the Rules and/or 1.8.14, Part III "Carrying out Classification Surveys in Compliance with International Conventions, Codes and Resolutions" of the Guidelines), name and qualification of the technician;
- conditions to ensure the performance of inspection, including the security conditions necessary means of access, lighting, ventilation, cleaning, etc.;
- description and technical characteristics of presentation graphics, positioning on the casing design (if necessary);
- real time possibility of monitoring the results of the examination/gauging (the presence of digital repeaters and/or personal computers with the appropriate software);
- the availability of two-way means of communication between the RS Surveyor and technicians, communication language;
- the necessity for non-destructive testing means, objectives, requirements, applicable standards and etc.

Plan of examination shall be drawn up in English. For the ships flying the Russian Federation flag and engaged in international voyages, the plan shall be drawn up both in English and in Russian.

For the ships flying the Russian Federation flag and not engaged in international voyages, the Plan may be drawn up only in Russian.

1.4 Confirmatory surveys/close-up surveys may be carried out by the RS Surveyor at selected locations to verify the results of the remote inspection technique. Confirmatory thickness measurements may be requested by the attending RS Surveyor appropriately.

2 CONDITIONS

2.1 Use of remote inspection technique may be restricted or limited where there is a record or indication of abnormal deterioration or damage to structure or to items to be inspected. The remote inspection technique may not be applicable if there are recommendations for repairs.

It may also be inapplicable if conditions, affecting the class of the ship, are found during the course of the inspection.

If the remote inspection technique reveals damage or deterioration that requires attention, the RS Surveyor may require close-up survey/thickness measurements without the use of remote inspection technique to be undertaken.

3 PROCEDURES

3.1 The inspection shall be carried out by a qualified technician with adequate knowledge of the items to be inspected.

Prior to the commencement of surveys, a pre-meeting shall be held between the technician(s), the shipowner's representative(s) and the attending RS Surveyor(s) for the purpose to ascertain that all the arrangements detailed in the Plan of examination are in place, so as to ensure the safe and efficient conduct of the inspection work to be carried out.

The RS Surveyor shall get acknowledged with the Plan of examination using remote inspection techniques agreed by RS. If, in the opinion of the RS Surveyor, at least one of the required conditions for performance of inspection is not fulfilled, the Surveyor is entitled to limit the process of inspection until elimination of a deficiency. The RS Surveyor may require improving of the quality of communication, pictorial presentations etc. The RS surveyor shall supervise permanently the results of work done using remote inspection techniques and correct the Plan of examination on the basis of the results of the inspection performed.

3.2 Use of means of thickness gauging and non-destructive testing may be required in conjunction with the remote inspection technique. In this case the relevant requirements of the Rules shall be fulfilled.

3.3 Items to be examined using remote inspection technique shall be sufficiently clean to permit meaningful examination/measurements according to the Rules.

3.4 Illumination and visibility shall be sufficient to allow for a meaningful examination/ measurements according to the Rules.

40. INSTRUCTIONS FOR PROCEDURE FOR CARRYING OUT MANDATORY ANNUAL SURVEYS AND TESTS OF VOYAGE DATA RECORDERS (VDR)/SIMPLIFIED VOYAGE DATA RECORDERS (S-VDR), AND RECOGNITION OF COMPANIES PROVIDING SUCH SERVICES

1 GENERAL

1.1 These Instructions define the procedure for carrying out mandatory annual surveys and tests of all type voyage data recorders (VDR)/simplified voyage data recorders (S-VDR) fitted on sea-going ships in compliance with reg. V/18, SOLAS-74/78 and MSC.1/Circ.1222 of 11 December 2006 "Guidelines on Annual Testing of Voyage Data Recorders (VDR) and Simplified Voyage Data Recorders (S-VDR))" and include the recommendations on the recognition of companies providing such services.

The Instructions are developed in accordance with reg. V/18 and 20, SOLAS-74/78, as well as with the Rules for the Classification Surveys of Ships, the Guidelines on Technical Supervision of Ships in Service, and the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships (Part I) of the Register.

1.2 Reg. V/18.8, SOLAS-74/78 provides for the mandatory annual performance test of the ship's voyage data recorder/simplified voyage data recorder, including all the sensors connected thereto¹, to verify the accuracy, duration and recoverability of the recorded data. In addition, during the annual test of the VDR/S-VDR, the accessibility for maintenance and the release of the container (capsule), which provides the protection and storage of the recorded data, are to be checked, as well as the operability of the equipment (acoustic beacon) intended for locating the container (capsule).

The above reg. also requires that the annual performance test of the VDR/S-VDR shall be conducted by approved specialized companies which, according to the test results, shall issue to the VDR/S-VDR a Certificate of Compliance with the specified operational requirements.

1.3 The annual performance test of the VDR/S-VDR on ships under the Register's technical supervision shall be conducted by the companies holding a Recognition Certificate (Form 7.1.4.2) which confirms their right and technical capabilities for such activities with regard to certain types of VDR/S-VDR.

Carrying out the annual performance test of the VDR/S-VDR, the recognized company's specialists shall accomplish the pertinent planned works on maintenance and, if needed, to replace integral batteries, as well as the acoustic beacon.

1.4 Shipowners shall ensure that the VDR/S-VDR fitted on their ships be annually surveyed and undergo maintenance by the specialized companies holding the Register Recognition Certificate for VDR/S-VDR- related work performance.

To accommodate performance checks to align with the appropriate survey under the Harmonized System of Survey and Certification (HSSC), the annual performance check may be carried out up to 3 months before the due date for a passenger ship and -/+ 3 months of the due date for a cargo ship. (The maximum period between subsequent checks is, therefore, 15 months for passenger ships and 18 months for cargo ships, unless either certificate (Passenger Ship Safety Certificate or Cargo Ship Safety Equipment Certificate) has been extended as permitted by SOLAS regulation 1/14, in which case a similar extension may be granted).

1.5 If the VDR/S-VDR fails to pass the performance test, its further use onboard ship is prohibited until all the malfunctions detected are fully rectified and the installation is retested by the Register-recognized company.

¹Hereinafter referred to as the VDR/S-VDR.

A Cargo Ship Safety Equipment Certificate or Passenger Ship Safety Certificate cannot be issued, endorsed or extended until the document (Certificate, etc.), issued by the Register-recognized company and confirming the performance and good technical condition of the VDR/S-VDR onboard ship, is submitted to the Register's Surveyor.

2 REQUIREMENTS FOR COMPANIES CONDUCTING ANNUAL PERFORMANCE TESTS OF VDR/S-VDR INSTALLATIONS IN COMPLIANCE WITH THE REGISTER REQUIREMENTS

2.1 The companies conducting annual tests and planned maintenance of voyage data recorders/simplified voyage data recorders, including the replacement of built-in batteries, acoustic beacons, shall be recognized by the Register for performance of such works.

2.2 In order to receive a Recognition Certificate for working with VDR/S-VDR (of one or more types), the company is to apply to the Register with a request and submit the following documents:

information about the manufacturer (organization and management structure, registration documents);

information about company's work experience in the field of service and repair of radio and navigational equipment;

list of personnel with the level of its professional training and qualification specified;

certificates of the company's personnel on undergoing training in testing and servicing certain VDR/S-VDR types (training shall be arranged at VDR/S-VDR manufacturer's);

list of equipment and spare parts (blocks) needed for annual tests and maintenance of VDR/S-VDR onboard ships;

list of testing equipment for the annual test of VDR/S-VDR with software versions in use specified;

manuals and instructions for the personnel on work performance with VDR/S-VDR onboard ships;

document form (of a Certificate, etc.) confirming the performance and fit technical condition of the VDR/S-VDR;

form of a record (of a statement, report, etc.) on the extent of tests and works, associated with the VDR/S-VDR, accomplished onboard ship;

document, issued to the given company by the VDR/S-VDR manufacturer, authorizing the former to test certain VDR/S-VDR types, as well as their maintenance.

2.3 The company applying to the Register for recognition of their working with a VDR/S-VDR is to:

.1 demonstrate its competence and capabilities in use of methods and ways for VDR/S-VDR performance tests;

.2 have an adequate number of specialists properly trained at the VDR/S-VDR manufacturer;

.3 ensure control over the quality of work performance during annual tests and maintenance of VDR/S-VDRs onboard ships;

.4 be provided with the sufficient number of tools and properly calibrated measuring (testing) instruments and diagnostic devices required for testing certain VDR/S-VDR types onboard ships. The equipment used for annual tests of VDR/S-VDR shall be provided with the software developed by the manufacturer for performance of the such work in question;

.5 have manufacturer's documented manuals and instructions on tests and maintenance of VDR/S-VDR;

.6 have the forms of records on the completed tests and works around which the manufacturer makes a decision on issuing the document (Certificate) confirming the performance and fit technical condition of the VDR/S-VDR;

.7 the company, which monitors the technical condition and maintenance of the VDR/S-VDR on ships, shall be authorized for test, maintenance and repairs performance by this equipment manufacturer.

2.4 The company shall receive, properly keep and regularly renew the manufacturer's pertinent documents, to arrange an appropriate training of technical personnel, to have tools, measuring (testing) instruments, as well as spare parts (blocks) for corresponding VDR/S-VDR types.

2.5 With the satisfactory results of Register's considering the request and documents submitted in line

with 2.2, and with the test performance confirming that the requirements of 2.3 are met, a Recognition Certificate provided by Section 8, PART I "General Regulations for Technical Supervision" of the Rules for Technical Supervision During Construction of Ships and Manufacture of Materials and Products for Ships shall be issued to the company.

Executing the Recognition Certificate, to be entered in its Appendix is Code 22006004MK "Annual performance testing of voyage data recorders (VDR) including all sensors in compliance with reg. V/18-8 of SOLAS-74" and/or Code 22006005 "Routine work on maintenance and repair of voyage data recorders; replacement of built-in power supply components of VDR" depending on which services the company can actually provide.

2.6 The period of Recognition Certificate validity, the procedure for its suspension and cancellation are defined in Section 3, PART I "General Regulations for Technical Supervision" of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships.

3 METHODOICAL INSTRUCTIONS ON ANNUAL TESTING VDR/S-VDR INSTALLATIONS ON SHIPS

3.1 Annual performance tests of the VDR/S-VDR on ships shall be conducted by the qualified personnel of a Register-recognized company which has undergone training at the equipment manufacturer and holds the relevant certificates.

Concurrent with VDR/S-VDR testing, the routine maintenance and (if required) replacement of built-in batteries and acoustic beacons are to be carried out. These works shall be conducted according to the instructions of the equipment manufacturer.

3.2 Conducting the annual performance test of the VDR/S-VDR, the following is to be checked:

.1 presence of the entry in a ship's log of the date of the last VDR/S-VDR test, and availability onboard ship of the previously issued document (Certificate) confirming the performance and fit technical condition of the VDR/S-VDR;

.2 correspondence of the initial data, recorded for permanent storage at the time of VDR/S-VDR commissioning onboard ship, with an actual condition at the time of testing (all changes among data sensors are to be recorded on the finite information carrier of the VDR/S-VDR);

.3 technical condition of all blocks and connecting cables of the VDR/S-VDR (absence of mechanical damages, dents, cracks, presence of marking, etc.);

.4 automatic activation of the VDR/S-VDR when power from the ship's source of electric energy is applied, and capability of the manual tripping of the system;

.5 continuous recording and storage of the recorded data during the last 12 h, and capability of their transfer to another carrier for longer storage;

.6 records of talks on VHF radiotelephone channels and of sound signals on the navigation bridge during two hours after switching-off the power supply from the ship's mains and the follow-up automatic tripping of the VDR/S-VDR;

.7 capability of removing a copy of recorded data without the opening-up of the protective container (capsule) and without data garbling;

.8 identity and accuracy of the recorded data in compliance with the instruction of the VDR/S-VDR manufacturer;

.9 activation of the VDR/S-VDR alarm when an uncorrectable error is detected during recording;

.10 serviceability of ship's data sensors connected to the VDR/S-VDR;

.11 condition of cooling fan filters, as well as other additional checks regulated by the instruction of the VDR/S-VDR manufacturer shall be carried out.

3.3 Resulting the annual test of the VDR/S-VDR by the specialist of the recognized company, who has accomplished this work onboard ship, a Report or another record with information on the extent of the checks and works performed is drawn up. With the satisfactory check results, basing on the above document, the recognized company draws up a document (Certificate, etc.) confirming the performance and fit technical condition of the VDR/S-VDR onboard ship.

4 DRAWING-UP OF RESULTS OF ANNUAL VDR/S-VDR TEST ON BOARD SHIPS

4.1 The fact that the annual VDR/S-VDR test was conducted, shall be noted in a ship's log, and the test results shall be drawn up with a document (Certificate, etc.) confirming the installation compliance with the requirements in force which are specified in the manufacturer's documentation.

4.2 The Certificate of compliance is issued basing on the Report or another record executed by the specialist of the Register-recognized company who has accomplished the test. In addition to the description of the extent of the works performed, the Report shall include the recommendations on maintenance of the equipment and the conclusion on the further use of the VDR/S-VDR onboard ship or the needed repairs or replacements of individual blocks (sensors, cable runs, etc.), as well as the conclusion with regard to issuing a document of compliance (Certificate, etc.).

The Report on test performance shall be signed by the authorized specialist of a recognized company and the shipowner's representative or by the ship's Master on behalf of the latter.

4.3 The form of the document of compliance (Certificate, etc.) is developed by either the VDR/S-VDR manufacturer or the company conducting the tests. The form of such document in use is to be submitted to the Register as part of documentation in the course of a recognition procedure. Any amendments to the form of this document are to be agreed with the Register Branch Office which has issued the Certificate of Compliance to the company.

4.4 The Certificate of Compliance shall be in English or in English with an interlinear translation and be completed at least in duplicate; one copy shall be available onboard ship till the date of the next annual test and another copy shall be sent to the Register Branch Office carrying out the technical supervision of the ship.

4.5 Model forms of the document of compliance are given in Appendix 1.

Appendix 1

MODEL FORM 1

**СВИДЕТЕЛЬСТВО О СООТВЕТСТВИИ СУДОВОГО РЕГИСТРАТОРА ДАННЫХ РЕЙСА
(РДР)/УПРОЩЕННОГО РЕГИСТРАТОРА ДАННЫХ РЕЙСА (У-РДР)
CERTIFICATE OF COMPLIANCE OF SHIPBORNE VOYAGE DATA RECORDER
(VDR)/SIMPLIFIED VOYAGE DATA RECORDER (S-VDR)**

Настоящим Свидетельством удостоверяется, что представителем
It is hereby certified that representative of the company

(наименование организации) (company name)

(должность, ф.и.о. представителя) (position in company, name)

проведена комплексная проверка судового регистратора данных рейса/упрощенного регистратора данных рейса¹, установленного на борту т/х _____ (номер ИМО _____), и установлено следующее:

performed testing of shipborne Voyage Data Recorder (VDR)/Simplified Voyage Data Recorder (S-VDR)¹ installed onboard the m/v _____ (IMO number) and defined the following:

¹ Ненужное зачеркнуть/Delete as appropriate.

№ п/п Nos.	Объект проверки Subject of tests	Результаты проверки ¹ Results ¹
1	Тип РДР/У-РДР ² , изготовитель, заводской (серийный) номер VDR/S-VDR ² type, manufacturer name and serial number	
2	Состояние оборудования РДР/У-РДР, соединительных кабелей, а также защитного контейнера (капсулы) The physical condition of the equipment and associated cables, paying particular attention to the protective capsule.	
3	Точность записи и воспроизведения данных Accuracy and recoverability of the recorded data	
4	Запись аварийных сигналов Recording of any existing alarms	
5	Работоспособность РДР/У-РДР в течение 1 ч 55 мин после отключения судового питания Confirming that the VDR/S-VDR is still operational 1 hour 55 minutes after the removal of the ship's main source of power supply	
6	Автоматическое выключение РДР/У-РДР спустя 2 ч после отключения судового питания Confirming that the VDR has switched off 2 hours after the removal of the ship's main source of power supply	
7	Наличие, техническое состояние и срок годности устройства автоматического отделения защитного контейнера (при наличии) Actual provision and expiry date of automatic release mechanism (if applicable)	
8	Наличие и качество маркировки на корпусе Availability and quality of markings	
9	Сроки годности встроенных элементов питания Internal battery expiry data	
10	Дата очередной проверки. Date of next testing.	

В результате выполненной проверки установлено, что механические, электрические, светотехнические и информационные параметры, а также документация на проверяемый РДР/У-РДР¹ соответствуют требованиям, изложенным в технической документации изготовителя.

It is hereby certified that all mechanical, electrical and information parameters, as well as the documentation on the VDR/S-VDR¹ are in compliance with the requirements indicated in technical documentation of manufacturer.

(тип РДР/У-РДР, заводской номер) (VDR / S-VDR type, manufacturer serial number)

может быть использован в качестве штатного навигационного оборудования на т/х
may be used as a navigational equipment on board m/v

(название судна) (ship's name)

Представитель организации
Testing company representative

Представитель судовладельца
Shipowner representative

(название организации, ф.и.о., подпись/
designation of company, name, signature)

(название предприятия, ф.и.о., подпись/
designation of manufacturer, name, signature)

«___» _____ 20 г.

«___» _____ 20 г.

¹ ОК — годное техническое состояние; NA — не применимо; NO — не годное техническое состояние/OK — fit technical condition; NA — not applicable; NO — unfit technical condition.

² Ненужное зачеркнуть/Delete as appropriate.

MODEL FORM 2

ANNUAL INSPECTION CERTIFICATE

Voyage Data Recorder (VDR)/Simplified Voyage Data Recorder (S-VDR)¹

Name of ship _____

IMO number _____

Owner _____

I hereby certify that on «____» _____ 20____, conducted the Annual Performance Test on Voyage Data Recorder/Simplified Voyage Data Recorder¹ serial number _____ existing on the above mentioned ship in accordance with International Convention SOLAS Chapter V (Regulation 18) and found it to be compliance with IMO Recommendation on Performance Standards:

for Voyage Data Recorders (VDR) — Resolution A.861(20)¹;
for Simplified Voyage Data Recorder (S-VDR) — Resolution MSC.163(78)¹.

(Signature — Certified Engineer).

(Print name — Certified Engineer)

Engineer Stamp

Date of Annual Performance test. «____» _____ 20____

¹Delete as appropriate.

41. GUIDELINES ON THE ASSESSMENT OF RESIDUAL FILLET WELD BETWEEN DECK PLATING AND LONGITUDINALS

1 GENERAL

The purpose of these Guidelines shall provide an evaluation method and criteria for a residual throat thickness for the fillet weld between the deck plate and deck longitudinals in order to prevent collapse accidents of aged oil tankers. To ensure that the evaluation of the ship's longitudinal strength is recognized valid, the fillet weld between the longitudinals and deck should be in sound condition.

2 EXTENT OF MEASUREMENT

Thickness measurement on deck shall be carried out according to Section 3 of these Guidelines, i.e. in every other deck longitudinal for three transverse sections, within the cargo area, as given in Table 7.3.3, paragraph 1.2 of the Condition Assessment Scheme (resolution MEPC.94(46), as amended). For the areas in tanks where environmental conditions seem to be similar, the extent of this thickness measurement may be specially considered by the attending Surveyor.

3 LOCAL THICKNESS MEASUREMENT AND CRITERIA

3.1 Method of local thickness measurement.

3.1.1 The extent of local measurement shall be set within approximately 50 mm of each side of the baseline, as shown in Fig. 3.1.1.

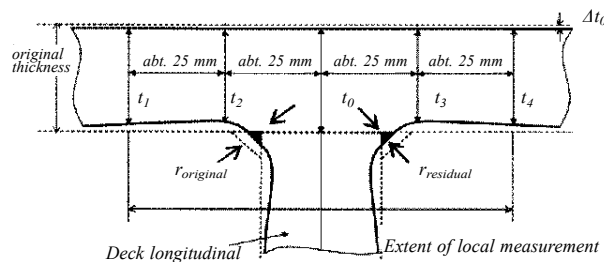


Fig. 3.1.1 Thickness measurement at deck plate from upper side

3.1.2 Within the extent of local measurement, at least five points shall be arranged, including one point on the baseline, with approximately 25 mm spacing at maximum. Thereby, the local thickness distribution for the deck plate can be obtained for the target longitudinal.

3.1.3 From the measured thickness distribution, a representative thickness diminution (Δ_t), defined by the following equation (3.1.3), shall be estimated from the measured data on the baseline and the minimum thickness value among the other points:

$$\Delta_t = t_0 - \min\{t_1, t_2, t_3, t_4\} \quad (3.1.3)$$

where t_0 = measured thickness on the baseline which is nearly equal to original thickness minus corrosion diminution for deck upper surface (Δt_0) as shown in Fig. 3.1.1;
 t_1, t_2, t_3, t_4 = thickness on each measuring point; and
 Δt = representative thickness diminution, which is assumed to be nearly equal to the diminution of the fillet weld throat thickness.

3.1.4 An estimated residual throat thickness is determined by:

$$r_{\text{oct.}} = r_{\text{original}} - \Delta t \quad (3.1.4)$$

where r_{original} = original throat thickness at the weld.

3.2 Criteria of measurement.

When the estimated residual throat thickness is zero or less than zero, repair or renewal of the weld should be considered also based on the result of a close-up survey.

4 ALTERNATIVE METHOD

4.1 Procedures for detachment of deck longitudinal member.

In cases where the longitudinal member is attached in sound condition, when the probe of the ultrasonic equipment is moved from the baseline to the outer side over the welding part, the ultrasonic echo from the bottom surface of the deck plate is not observed just over the welding part.

However, in cases where the longitudinal member is detached from the deck plate, when the probe of the ultrasonic equipment is moved from the baseline to the outer side beyond the welding part, the ultrasonic signal echo can be observed continuously, even if the probe is on the detached welding part as shown in Fig. 4.

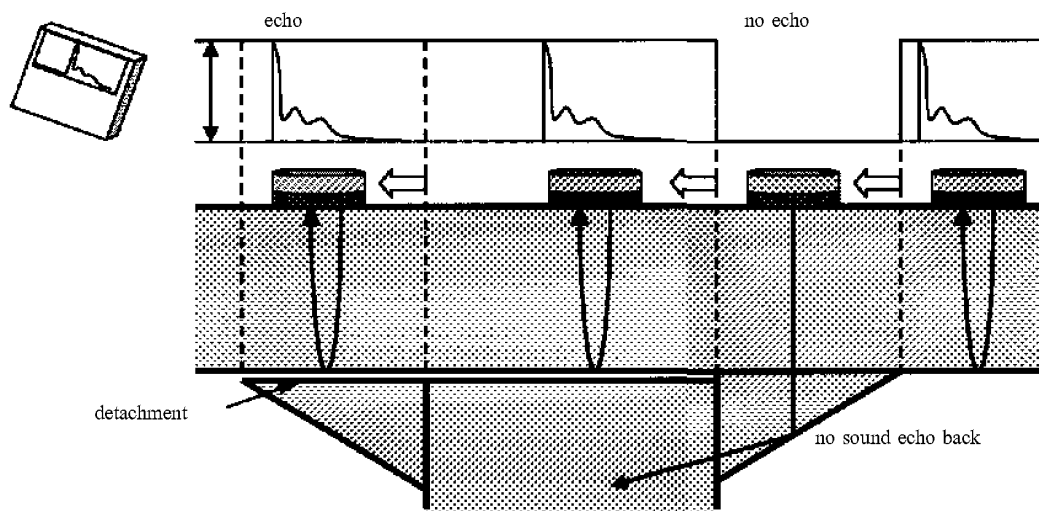


Fig. 4 Alternative method

42. GUIDELINES ON ANNUAL TESTING OF THE AUTOMATIC IDENTIFICATION SYSTEM (AIS)¹
(MSC.1/CIRC.1252, 22 OCTOBER 2007)

1. The annual testing of the automatic identification system (AIS) should be carried out by a qualified radio inspector authorized by the Flag State Administration or a recognized organization.

2. The annual testing of the AIS installation should include:

.1 installation details including antenna layout, initial configuration report, interconnection diagrams, provision of the pilot plug and power supply arrangements;

.2 checking the correct programming of the ships static information;

.3 the ability of the AIS to receive ships dynamic information from the appropriate sensors;

.4 the ability to correctly input the ships voyage related data;

.5 a performance test of the equipment including radio frequency measurements; and

.6 an on-air test that the unit is working correctly using for example an appropriate Vessel Traffic Service (VTS) station or a suitable test equipment.

3. To accommodate performance test to align with the appropriate survey under the Harmonized System of Survey and Certification (HSSC), the annual testing may be carried out:

.1 up to 3 months before the due date of the passenger ship renewal survey or the cargo ship safety equipment renewal survey; and

.2 3 months before or after the due date but not later than the date of completion of the cargo ship safety equipment periodical/ annual survey (the maximum period between subsequent test is governed by the time window associated to the subsequent surveys, unless either certificate has been extended as permitted by SOLAS-74/78, regulation I/14, in which case a similar extension may be granted by the Flag State MA).

4. The annual testing should be recorded in the form of the model test report given in the appendix. If the language used is neither English, nor French, nor Spanish, the text should include a translation into one of these languages. A copy of the test report should be retained on board the ship.

APPENDIX

AUTOMATIC IDENTIFICATION SYSTEM (AIS) TEST REPORT

Name of ship/ call sign: _____

MMSI number: _____

Port of registry: _____

IMO Number: _____

Gross tonnage: _____

Date keel laid: _____

¹Refer to Recommendation on performance standards for a universal shipborne identification system (AIS) (resolution MSC.74(69), annex 3).

	Item	Status:
1. Installation details:		
1.1	AIS transponder type:	
1.2	Type approval certificate	
1.3	Initial installation configuration report on board?	
1.4	Drawings provided? (Antenna-, AIS-arrangement and block diagram)	
1.5	Main source of electrical power	
1.6	Emergency source of electrical power	
1.7	Capacity to be verified if the AIS is connected to a battery	
1.8	Pilot plug near pilots operating position?	
1.9	120 V AC provided near pilot plug? (Panama and St. Lawrence requirement)	
2. AIS programming – Static information		
2.1	MMSI number	
2.2	IMO number	
2.3	Radio call sign	
2.4	Name of ship	
2.5	Type of ship	
2.6	Ship length and beam	
2.7	Location of GPS antenna	
3. AIS programming – Dynamic information		
3.1	Ships position with accuracy and integrity status (Source: GNSS)	
3.2	Time in UTC (Source: GNSS)	
3.3	Course over ground (COG) (will fluctuate at dockside) (Source: GNSS)	
3.4	Speed over ground (SOG) (zero at dockside) (Source: GNSS)	
3.5	Heading (Source: Gyro)	
3.6	Navigational status	
3.7	Rate of turn, where available (ROT)	
3.8	Angle of heel, pitch and roll, where available	
4. AIS programming – voyage related information		
4.1	Ships draught	
4.2	Type of cargo	
4.3	Destination and ETA (at masters discretion)	
4.4	Route plan (optional)	
4.5	Short safety-related messages	
5. Performance test using measuring instrument		
5.1	Frequency measurements AIS ch. 1 and 2, GMDSS ch. 70	
5.2	Transmitting output, AIS ch. 1 and 2, GMDSS ch.70	
5.3	Polling information ch. 70	
5.4	Read data from AIS	
5.5	Send data to AIS	
5.6	Check AIS response to "virtual vessels"	

	Item	Status:
6. "On air" performance test		
6.1	Check reception performance	
6.2	Confirm reception of own signal from other ship/ VTS	
6.3	Polling by VTS/ shore installation	

Electromagnetic interference from AIS observed to other installations?:	

Remarks:

The AIS has been tested according to IMO SN/ Circ. 227 and resolution MSC.74(69), annex 3		
Name of Radio Inspector	Date and place	Name of Radio Inspector Company

43. SURVEY GUIDELINES FOR TANKS IN WHICH SOFT COATINGS HAVE BEEN APPLIED

1 GENERAL INFORMATION ON SOFT COATINGS

1.1 General.

Soft Coatings always remain soft and can be removed or damaged by walking, touching, erosion etc. It is important to note that soft coating products are very diverse and can vary by:

Chemistry

Method of Protection

Thickness

Opacity

Application method

1.2 Chemistry.

Products can be one or a combination of the following:

Lanolin/ wool grease-based

Petroleum-based

Vegetable oil-based

Organic/ inorganic

Each type has its own unique characteristics and corrosion protection capabilities.

1.3 Method of protection.

Products can be classed by one or a combination of the following:

Corrosion inhibitor (interact with oxides to prevent further oxidation)

Corrosion barrier (prevents oxygen from reaching metal surface)

It should be noted that a pure corrosion barrier product will still allow a corrosion cell to be active underneath the product, while a corrosion inhibitor stops this activity.

1.4 Thickness.

Product film thickness can vary from a thin film of 3 mils (76,2 microns) up to a thick film of 80 mils (2032 microns). This is an important feature to consider when inspecting a tank, since a thicker product may be safety hazard and require spot removal in order to see the steel surface underneath.

1.5 Opacity.

The products are either:

Opaque

Transparent

Again, this feature will have an impact on the inspection of the tank. The opaque products will require spot removal to see the steel surface underneath, whereas the transparent products could allow the inspector to see most of the steel surface.

1.6 Application method.

Products can be applied by either of the following methods:

Spray

Float

In fact some products can be applied by both methods. It should be noted that the float method will require more product, but no staging, and may cause risk of water pollution when applied.

2 SURVEY GUIDELINES

2.1 General.

Application of soft coatings does not allow relaxation of the requirements for annual examination of salt water ballast tanks.

Soft coatings always remain soft and, as such, present a hazard to the Surveyor during structural inspection of tanks.

These guidelines are intended to provide guidance for both access and survey of tanks in which soft coatings have been applied.

2.2 Access.

Surveyors are to exercise extreme caution in the survey of tanks in which soft coatings have been applied. The soft coating by their very nature will make the footing very hazardous.

Generally, areas in way of access openings and ladders, walkways where provided and other areas, either identified prior to the start of the survey or subsequent to the initial entry, are to be cleaned free of soft coating. Areas are to be cleaned for a distance of 1,2 m (4 feet) in each direction of the Surveyor's route, including all railings and other hand grabs in way.

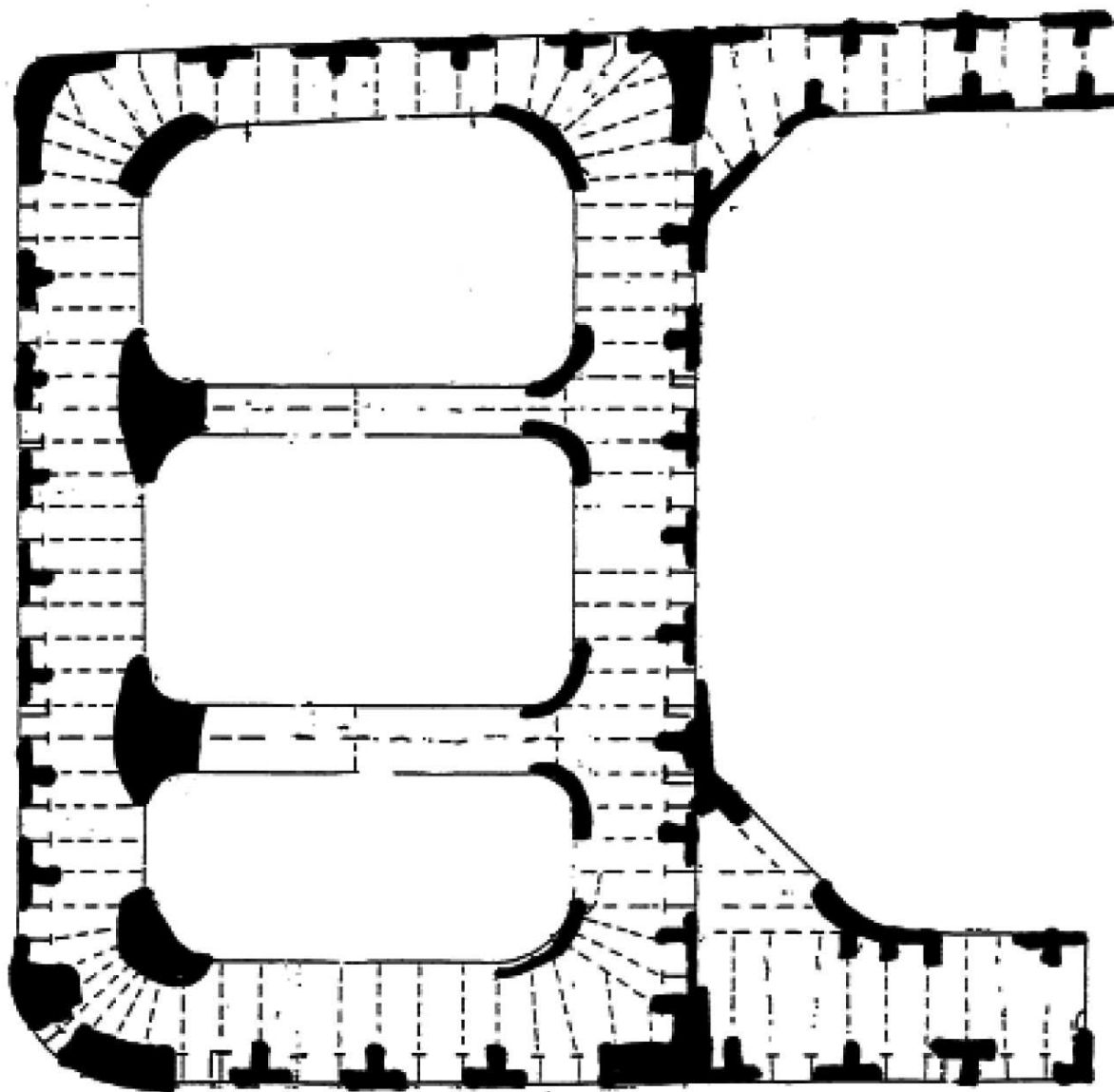
Note. These guidelines do not cover the normal hazard associated with confined space entry for which additional precautions pointed out in Recommendation of Labour safety regulation for RS surveyors during survey of ships and items of RS technical supervision shall be adhered to.

2.3 Overall survey.

Representative areas resembling close-up survey requirements are to be cleaned for survey including access requirements above. Alternatively, soft coatings could be removed as in attached guidance sketches, provided safe access could also be provided.

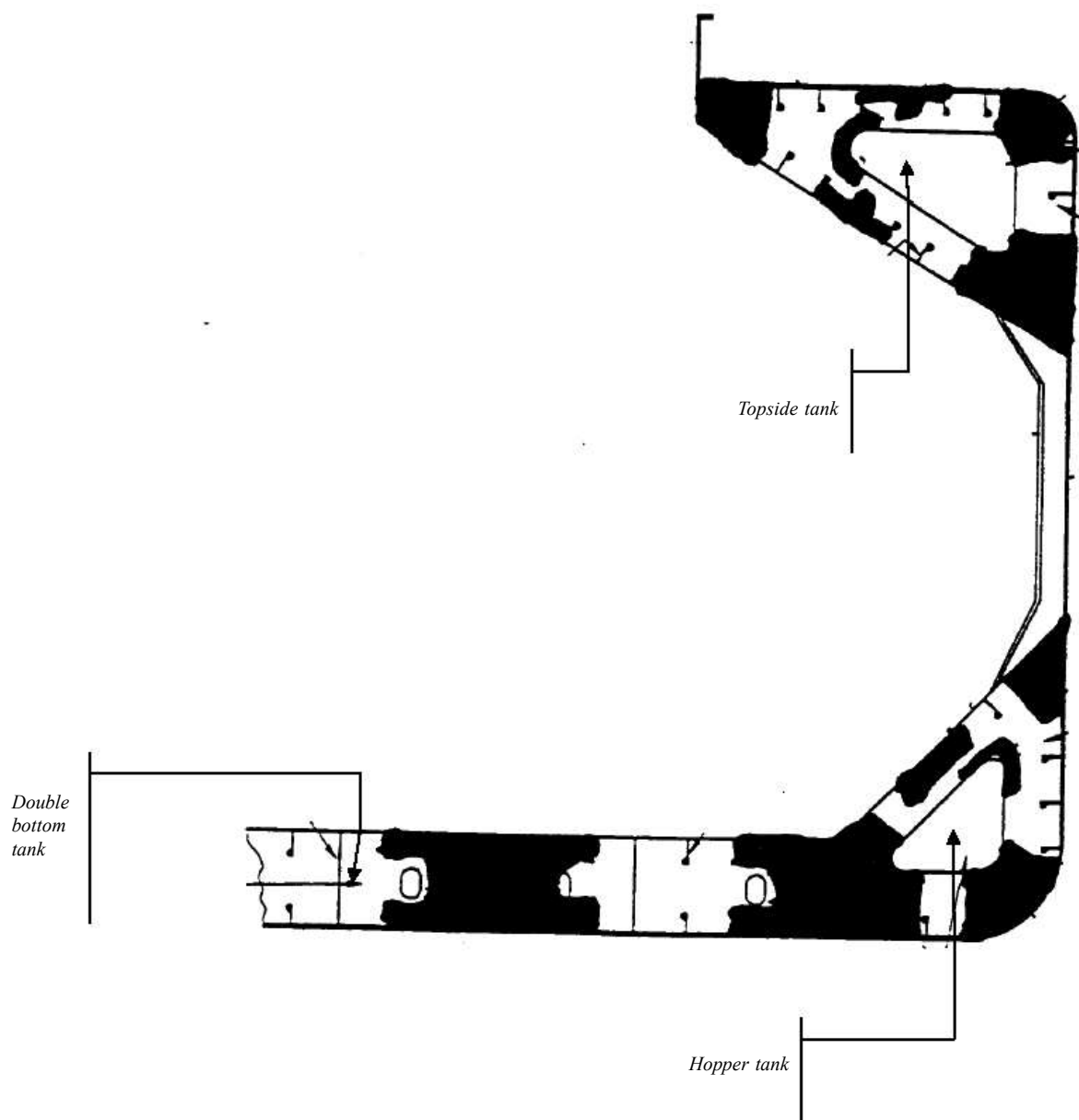
It must be kept in mind that, by their very nature, the effective life of soft coating systems is usually restricted to only about two to four years, before further maintenance and touch-up is required. Visual assessment of their existing condition can also be very difficult and somewhat misleading, especially if these have been used to cover-up already severely corroded areas of the structure.

OIL CARRIER



Shaded areas indicate guidance for the removal of soft coatings at one transverse ring frame in each tank requiring overall survey.

BULK CARRIER



44. ADDITIONAL REQUIREMENTS FOR SURVEY OF MODU AND FOP IN ACCORDANCE WITH APPLICABLE CODES

1 GENERAL

Provisions of the Annex are applicable to surveys of MODU/FOP, for which requirements of codes for construction and equipment of MODU 2009 (refer to IMO resolution A.1023(26)), 1989 (refer to IMO resolution IMO A.649(16)), 1979 (refer to IMO resolution IMO A.414(XI)) shall apply, unless other is stated in the text.

2 ACCESS TO STRUCTURES (FOR MODU AND FOP ONLY, WHERE 2009 MODU CODE SHALL BE APPLIED)

2.1 Access Manual.

2.1.1 Means of access to carry out overall and close-up inspections and thickness measurements (of hull structures) shall be described in an access manual (hereinafter referred to as "the Access Manual") which may be incorporated in the unit's Operating Manual. The Access Manual shall be updated as necessary, and an updated copy maintained on board. The structure of the Access Manual shall include the following for each space:

.1 plans showing the means of access to the space, with appropriate technical specifications and dimensions;

.2 plans showing the means of access within each space to enable an overall inspection to be carried out, with appropriate technical specifications and dimensions. The plans shall indicate from where each area in the space can be inspected;

.3 plans showing the means of access within the space to enable close-up inspections to be carried out, with appropriate technical specifications and dimensions. The plans shall indicate the positions of critical structural areas, whether the means of access is permanent or portable and from where each area can be inspected;

.4 instructions for inspecting and maintaining the structural strength of all means of access and means of attachment, taking into account any corrosive atmosphere that may be within the space;

.5 instructions for safety guidance when rafting is used for close-up inspections and thickness measurements;

.6 instructions for the rigging and use of any portable means of access in a safe manner;

.7 an inventory of all portable means of access; and

.8 records of periodical inspections and maintenance of the unit's means of access.

Interpretation¹:

The Access Manual shall address spaces listed in 2.2.2 of 2009 MODU Code considering UI MODU 1 (May_2015) (Rev. 1 Oct 2015)². As a minimum, the Access Manual shall be in English and contain the following parts:

¹This Interpretation shall be applied for units contracted for construction from 01/07/2016, unless there are written instructions to apply a different interpretation by the Flag State MA on whose behalf the RS unit is surveyed.

The "contracted for construction" date means the date on which the contract to build the unit is signed between the prospective owner and the shipbuilder (also refer to IACS PR No.29).

² UI MODU 1 (May_2015) (Rev. 1 Oct 2015) shall be applied for units contracted for construction from 01.07.2017, unless there are written instructions to apply a different interpretation by the Flag State MA on whose behalf the RS unit is surveyed.

Part 1: Plans, instructions and inventory required by paras 1.1 to 1.7 of 2.2.3.1 of 2009 MODU Code. This part shall be approved by the Flag State MA or the organization recognized by the Flag State MA.

Part 2: Form of record of inspections and maintenance, and change of inventory of portable equipment due to additions or replacement after construction. This part shall be approved for its form only at new building. The following matters shall be addressed in the Access Manual:

- the Access Manual shall clearly cover scope as specified in the regulations for use by crews, surveyors and Port State Control (PSC) officers;

- approval/re-approval procedure for the manual, i.e. any changes of the permanent, portable, movable or alternative means of access within the scope of the regulation and the Technical provisions is subject to approval by the Flag State MA or by the organization recognized by the Flag State MA;

- verification of means of access shall be part of safety construction survey to confirm their effectiveness in that space which is subject to the statutory survey;

- inspection of means of access by the crew and/or a competent inspector of the company shall be a part of regular inspection and maintenance (refer to 2.2.1.3 and interpretation hereto in UI MODU 1 and UI MODU 1 (May 2015) (Rev. 1 Oct 2015));

- actions to be taken if means of access is found unsafe for use;

- in case of use of portable equipment, the means of access within each space indicating where and how each area in the space can be inspected shall be provided. (refer to IACS Recommendation No. 90).

2.1.2 For the purpose of this paragraph "critical structural areas" are locations which have been identified from calculations to require monitoring or from the service history of similar or sister units to be sensitive to cracking, buckling, deformation or corrosion which would impair the structural integrity of the unit.

Interpretation¹: Critical structural areas shall be identified by advanced calculation techniques for structural strength and fatigue performance, if available, and feedback from the service history and design development of similar or sister units (refer to Interpretation¹ to para 2.2.4 in UI MODU1).

2.2 General technical specifications.

2.2.1 For access through horizontal openings, hatches or manholes, the dimensions shall be sufficient to allow a person wearing a self-contained air-breathing apparatus and protective equipment to ascend or descend any ladder without obstruction and also provide a clear opening to facilitate the hoisting of an injured person from the bottom of a confined space. The minimum clear opening shall not be less than 600 mm × 600 mm. When access to a hold is arranged through a flush manhole in the deck or a hatch, the top of the ladder shall be placed as close as possible to the deck or hatch coaming. Access hatch coamings having a height greater than 900 mm shall also have steps on the outside in conjunction with the ladder (refer to Interpretation¹ to 2.2.4 in UI MODU 1).

2.2.2 For access through vertical openings, or manholes, in swash bulkheads, floors, girders and web frames providing passage through the length and breadth of the space, the minimum opening shall be not less than 600 mm × 800 mm at a height of not more than 600 mm from the bottom shell plating unless gratings or other footholds are provided (refer to Interpretation¹ to 2.2.4.2 in UI MODU 1).

2.2.3 Interpretation¹ shall apply to 2.2.1.2 of 2009 MODU Code on permanent means of access.

Interpretation: Some possible alternative means of access listed in 3.9 of the MODU Technical Provisions (MODU TP) for means of access inspection (refer to Appendix 1 to UI MODU 1). Always subject to acceptance as equivalent by the Flag State MA, alternative means such as an unmanned robot arm, ROVs with necessary equipment, permanent means of access for overall and close-up inspections and thickness measurements of the deck head structures such as deck transverses and deck longitudinals of ballast tanks and other tanks, holds and other spaces where gas hazardous atmosphere may be present, shall be capable of:

¹This Interpretation shall be applied for units contracted for construction from 01/07/2016, unless there are written instructions to apply a different interpretation by the Flag State MA on whose behalf the RS unit is surveyed.

The "contracted for construction" date means the date on which the contract to build the unit is signed between the prospective owner and the shipbuilder (also refer to IACS PR No.29).

safe operation in ullage space in gas-free environment;
introduction into the place directly from a deck access.

When considering use of alternative means of access as addressed by 3.9 of the MODU TP, refer to IACS Recommendation No.91 "Guidelines for Approval/Acceptance of Alternative Means of Access. Rev.2 (May 2014).

2.2.4 The means of access arrangements, including portable equipment and attachments, shall be periodically inspected by the crew or competent inspectors as and when it is going to be used to confirm their safe condition prior to being used.

Interpretation¹:

A survey of any space that contains means of access shall include verification of the continued effectiveness of the means of access in that space.

Records of all inspections of means of access shall be established based on the requirements detailed in the MODU's Safety Management System. The records shall be readily available to persons using the means of access and a copy shall be attached to the Means of Access Manual. The latest records for the inspected portion of the means of access shall include as a minimum the date of the inspection, the name and title of the inspector, a confirmation signature, the description and location of means of access inspected, verification of continued serviceable condition or details of any deterioration or substantial damage found. The records shall be maintained for verification.

3 SCOPE OF SURVEY FOR THE MODU/FOP STRUCTURES, MECHANISMS AND ELECTRICAL EQUIPMENT

3.1 The scope of survey for the MODU/FOP structures, mechanisms, systems, arrangements and electrical equipment shall be regulated by the applicable requirements of 2.1, Part III "Survey of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for the Equipment of Sea-Going Ships" of the Guidelines.

4 PROTECTIVE COATINGS OF DEDICATED SEAWATER BALLAST TANKS

4.1 All dedicated seawater ballast tanks shall be coated in accordance with the recommendations of the Organization². For the purpose of this Section pre-load tanks on self-elevating units shall be considered dedicated seawater ballast tanks. Mat tanks and spud cans on such units shall not be considered dedicated seawater ballast tanks.

4.2 Maintenance of the protective coating system shall be included in the overall unit's maintenance scheme. The effectiveness of the protective coating system shall be verified during the life of a unit by the Administration or an organization recognized by the Administration.

5 INCLINING TEST

5.1 a record of all changes to machinery, structure, outfitting and equipment that affect the light ship data shall be maintained in a light ship data alterations log and be taken into account in daily operations.

5.2 for column-stabilized units:

¹This Interpretation shall be applied for units contracted for construction from 01/07/2016, unless there are written instructions to apply a different interpretation by the Flag State MA on whose behalf the RS unit is surveyed.

The "contracted for construction" date means the date on which the contract to build the unit is signed between the prospective owner and the shipbuilder (also refer to IACS PR No.29).

²Refer to Performance standard for protective coatings for dedicated seawater ballast tanks in all types of ships and double-skin spaces of bulk carriers, adopted by the Maritime Safety Committee by resolution MSC.215(82).

.1 a light-weight check or inclining test shall be conducted at the first renewal survey. If a lightweight check is conducted and it indicates a change from the calculated light ship displacement in excess of 1 per cent of the operating displacement, an inclining test shall be conducted, or the difference in weight shall be placed in an indisputably conservative vertical centre of gravity and approved by the Administration;

.2 if the check or test at the first renewal survey demonstrated that the MODU was maintaining an effective weight control programme, and at succeeding renewal surveys this is confirmed by the records in compliance with the requirements in 5.1, the light ship displacement may be verified in operation by comparison of the calculated and observed draught. Where the difference between the expected displacement and the actual displacement based upon draught readings exceeds 1 % of the operating displacement, a light-weight check shall be completed in compliance with the requirements in 5.2.1.

6 FREEBOARD

The scope of surveys for issuing the International Load Line Certificate is regulated by the requirements in 2.3, Part III "Survey of Ships in Compliance with International Conventions, Codes and Resolutions" of the Guidelines with due regard for that follows.

6.1 Self-elevating units.

6.1.1 Load lines shall be assigned to self-elevating units as calculated under the terms of the LL-66/88 Convention. When floating, or when in transit from one operational area to another, units shall be subject to all the conditions of assignment of the LL-66/88 Convention unless specifically excepted. However, these units shall not be subject to the terms of that Convention while they are supported by the seabed or are in the process of lowering or raising their legs.

6.1.2 The minimum freeboard of units which due to their configuration cannot be computed by the normal methods laid down by the LL-66/88 Convention shall be determined on the basis of meeting applicable provisions regarding intact stability, damage stability and structure in the afloat condition.

7 THE SCOPE OF SURVEY FOR FIRE-FIGHTING EQUIPMENT, LIFE-SAVING APPLIANCES AND EQUIPMENT, RADIO AND NAVIGATION EQUIPMENT

The scope of surveys of life-saving appliances and equipment, radio and navigation equipment is regulated by the requirements in 2.1, Part III "Survey of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for the Equipment of Sea-Going Ships" of the Guidelines as specified below.

7.1 Fire safety.

7.1.1 Operational readiness and maintenance.

7.1.1.1 The following functional requirements shall be met:

.1 fire alarm systems, as well as fire-fighting systems, equipment and outfit shall be maintained ready for use; and

.2 fire alarm systems, as well as fire-fighting systems, equipment and outfit shall be properly tested and inspected.

7.1.1.2 At all times while the unit is in service, the requirements in 7.1.1.1 shall be complied with. A unit is not in service when:

.1 it is in for repairs or lay up (either at anchor or in port) or in dry-dock;

.2 it is declared not in service by the owner or the owner's representative.

7.1.1.3 Operational readiness.

7.1.1.3.1 The following fire alarm systems, as well as fire-fighting systems, equipment and outfit shall be kept in good order so as to ensure their intended performance if a fire occurs:

.1.1 structural fire protection including fire-resisting divisions and protection of openings and penetrations in these divisions;

- .1.2 fire detection and fire alarm systems;
- .1.3 gas detection and alarm systems; and
- .1.4 means of escape systems and appliances.

7.1.1.3.2 Fire-fighting systems and appliances, and portable gas detection systems shall be kept in good working order and readily available for immediate use. Portable extinguishers which have been discharged shall be immediately recharged or replaced with an equivalent unit.

7.1.1.4 Maintenance, testing and inspections.

7.1.1.4.1 Maintenance, testing and inspections shall be carried out based on the guidelines developed by the Organization¹, and in a manner having due regard to ensuring the reliability of fire-fighting systems and appliances.

7.1.1.4.2 The maintenance plan shall be kept on board the unit and be available for inspection whenever required by the Administration.

7.1.1.4.3 The maintenance plan shall include at least the following fire protection systems and fire-fighting systems and appliances, where installed:

- .1 fire mains, fire pumps and hydrants including hoses, nozzles and international shore connections;
- .2 fixed fire detection and fire alarm systems;
- .3 fixed fire-extinguishing systems and other fire-extinguishing appliances;
- .4 automatic sprinkler, fire detection and fire alarm systems;
- .5 ventilation systems including fire and smoke dampers, fans and their controls;
- .6 emergency shut down of fuel supply;
- .7 fire doors including their controls;
- .8 general emergency alarm systems;
- .9 emergency escape breathing devices;
- .10 portable fire extinguishers including spare charges or spare extinguishers;
- .11 portable hydrogen sulphide gas detection monitoring devices;
- .12 portable flammable gas and oxygen monitoring devices;
- .13 gas detection and alarm systems; and
- .14 fire-fighter's outfits.

7.1.1.4.4 The maintenance plan may be computer-based.

7.1.1.5 Number and disposition of fire-fighting systems and means are determined in accordance with the provisions of applicable MODU Code.

7.2 Life-saving appliances.

7.2.1 All life-saving appliances shall comply with the applicable SOLAS-74, as amended, regulations and Chapter 10 of the applicable MODU Code.

7.2.2 Content, number and disposition of life-saving appliances shall be determined in accordance with Chapter 10 of the applicable MODU Code.

7.2.3 Evaluation, testing and approval of life-saving appliances.

Life-saving appliances shall be evaluated, tested and approved as provided in regs.III/4 and III/5 in SOLAS-74, as amended.

7.2.4 New and novel life-saving appliances.

New and novel life-saving appliances shall meet the applicable provisions in Chapter III in SOLAS-74, as amended, including those for servicing and maintenance.

7.2.5 Alternative design and arrangements.

When alternative design or arrangements deviate from the prescriptive provisions of the 2009 MODU Code, an engineering analysis, evaluation and approval of the design and arrangements shall be carried out in accordance with reg. III/38 in SOLAS-74, as amended, based on the Guidelines developed by the Organization².

7.2.6 Periodical checks, maintenance and tests.

¹Refer to the Guidelines for the on maintenance and inspection of fire protection systems and appliances (MSC/Circ.850).

²Refer to the Guidelines on alternative design and arrangements for SOLAS Chapters II-1 and III (MSC.1/Circ.1212).

Periodical checks, maintenance and tests of life-saving appliances, systems and their launching appliances shall be carried out in accordance with the applicable requirements of SOLAS-74 as amended as well as the applicable MODU Code, if any.

7.3 Radio station.

7.3.1 The radio station of a unit shall be subject to survey as specified below:

.1 by the Administration which issues the licence or its authorized representative before the radio station is put into service;

.2 when the unit is moved and comes under the administrative control of another coastal State, a survey may be carried out by that State or its authorized representative;

.3 within three months before or after the anniversary date of the 2009 MODU Code certificate, a periodical survey is carried out by an officer of the Administration and/or the coastal State or their respective authorized representative. For MODU/FOP where 1979 or 1989 MODU Code is applied, such a survey shall be carried out with schedule of once per 12 months.

7.3.2 The Administration may recognize the coastal State as its authorized representative.

7.3.3 After completing the survey, an authorized representative of the coastal State shall issue a report a copy of which shall be forwarded to the Administration.

7.3.4 Content and number of necessary radio-equipment shall be in compliance with the applicable MODU Code.

7.4 Navigation equipment.

7.4.1 Content and number of necessary navigation equipment shall correspond with requirements of applicable MODU Code.

7.4.2 Administrations may exempt MODUs from navigation equipment carriage requirements, in accordance with reg. V/3 in SOLAS-74, as amended.

8 LIFTING APPLIANCES

8.1 The scope of surveys for compliance with the requirements of the ILO-152 Convention for filling in and distributing to the Register of Ship's Lifting Appliances and Cargo Handling Gear is regulated by the requirements in 3.1.1, Part III "Survey of Ships in Compliance with International Conventions, Codes, Resolutions and Rules for the Equipment of Sea-Going Ships" of the Guidelines with due account for the following below. During survey of lifting appliances it is necessary to follow requirement of the applicable MODU Code.

8.1.1 Cranes used for loading and discharging of offshore supply vessels shall be furnished with rating tables or curves which take into account the dynamics associated with the unit's and vessel's motions.

8.1.2 Except when loads are determined and marked prior to lifting, each crane shall be fitted, to the satisfaction of the Administration, with a safety device to give the crane operator a continuous indication of hook load and rated load for each radius. The indicator shall give a clear and continuous warning when approaching the rated capacity of the crane.

8.1.3 A crane manual shall be provided for each crane and shall be readily available. This manual shall contain full information concerning:

.1 design standard, operation, erection, dismantling and transportation;

.2 all limitations during normal and emergency operations with respect to safe working load, safe working moment, maximum wind, maximum heel and trim, design temperatures and braking systems;

.3 all safety devices;

.4 testing of the emergency lowering system for personnel transfer, if fitted;

.5 schematic diagrams for electrical, hydraulic and pneumatic systems and equipment;

.6 materials used in construction, welding procedures and extent of non-destructive testing; and

.7 guidance on maintenance and periodic inspection.

9 PERSONNEL AND PILOT TRANSFER (FOR MODU/FOP WHERE THE PROVISIONS OF 2009 MODU CODE APPLY)

9.1 All personnel transfer nets or platforms shall be designed and constructed to the satisfaction of the Administration.

9.2 A personnel transfer net or platform shall be used to satisfy the pilot transfer arrangement required by reg.V/23 in SOLAS-74, as amended.

10 OPERATIONAL DOCUMENTATION OF MODU/FOP

10.1 Operating manual.

10.1.1 An operating manual containing guidance for the safe operation of the unit for both normal and envisaged emergency conditions, approved by the Administration, shall be provided onboard and be readily available to all concerned. The manual shall, in addition to providing the necessary general information about the unit, contain guidance on, and procedures for, the operations that are vital to the safety of personnel and the unit. The manual shall be concise and be compiled in such a manner that it is easily understood. The manual shall be provided with a contents list, an index and wherever possible be cross-referenced to additional detailed information which shall be readily available on board. Content of the Operating Manual is determined in accordance with the applicable MODU Code. The content of the Operating Manual provided in 10.1.2 — 10.1.5 is in accordance with Chapter 14 of 2009 MODU Code.

10.1.2 The operating manual for normal operations shall include the following general descriptive information, where applicable:

- .1** a description and particulars of the unit;
- .2** a chain of command with general responsibilities during normal operation;
- .3** limiting design data for each mode of operation, including draughts, air gap, waveheight, wave period, wind, current, sea and air temperatures, assumed sea bed conditions, and any other applicable environmental factors, such as icing;
- .4** a description of any inherent operational limitations for each mode of operation and for each change in mode of operation;
- .5** the location of watertight and weather tight boundaries, the location and type of watertight and weathertight closures and the location of downflooding points;
- .6** the location, type and quantities of permanent ballast installed on the unit;
- .7** a description of the general emergency, toxic gas (hydrogen sulphide), combustible gas, fire alarm and abandon unit signals;
- .8** for self-elevating units, information regarding the preparation of the unit to avoid structural damage during the setting or retraction of legs on or from the seabed, or during extreme weather conditions while in transit, including the positioning and securing of legs, cantilever drill floor structures and drilling equipment or materials which might shift position;
- .9** light ship data together with a comprehensive listing of the inclusions and exclusions of semipermanent equipment;
- .10** stability information setting forth the allowable maximum height of the centre of gravity in relation to draught data or other parameters based upon compliance with the intact and damage criteria;
- .11** a capacity plan showing the capacities and the vertical, longitudinal and transverse centres of gravity of tanks and bulk material stowage spaces;
- .12** tank sounding tables or curves showing capacities, the vertical, longitudinal and transverse centres of gravity in graduated intervals and the free surface data of each tank;
- .13** acceptable structural deck loadings;
- .14** identification of helicopters suited for the design of the helideck and any limiting conditions of operation;

- .15 identification and classification of hazardous areas on the unit;
 - .16 description and limitations of any on-board computer used in operations such as ballasting, anchoring, dynamic positioning and in trim and stability calculations;
 - .17 description of towing arrangements and limiting conditions of operation;
 - .18 description of the main power system and limiting conditions of operation; and
 - .19 a list of key plans and schematics.
- 10.1.3** The operating manual for normal operations shall also include, where applicable:
- .1 guidance for the maintenance of adequate stability and the use of the stability data;
 - .2 guidance for the routine recording of lightweight alterations;
 - .3 examples of loading conditions for each mode of operation, and instructions for developing other acceptable loading conditions, including the vertical components of the forces in the anchor cables (this section of the Operating Manual shall provide description and check-list with the requirements for safety measures and necessary equipment as well as procedure requirements concerning helicopter operations (refer to 14.3, Chapter 14 of 2009 MODU Code));
 - .4 for column-stabilized units, a description, schematic diagram and guidance for the operation of the ballast system and of the alternative means of ballast system operation, together with a description of its limitations, such as pumping capacities at various angles of heel and trim;
 - .5 a description, schematic diagram, guidance for the operation of the bilge system and of the alternative means of bilge system operation, together with a description of its limitations, such as draining of spaces not directly connected to the bilge system;
 - .6 fuel oil storage and transfer procedures;
 - .7 procedures for changing modes of operation;
 - .8 guidance on severe weather operations and time required to meet severe storm conditions, including provisions regarding lowering or stowage of equipment, and any inherent operational limitations;
 - .9 description of the anchoring arrangements and anchoring or mooring procedures and any limiting factors;
 - .10 personnel transfer procedures;
 - .11 procedures for the arrival, departure and fuelling of helicopters;
 - .12 limiting conditions of crane operations;
 - .13 description of the dynamic positioning systems and limiting conditions of operation;
 - .14 procedures for ensuring that the requirements of applicable international codes for the stowage and handling of dangerous and radioactive materials are met;
 - .15 guidance for the placement and safe operation of the well testing equipment. The areas around possible sources of gas release shall be classified in accordance with the requirements in 6.1 for the duration of well test operations;
 - .16 procedures for receiving vessels alongside; and
 - .17 guidance on safe towing operations such as to reduce to a minimum any danger to personnel during towing operations.
- 10.1.4** The operating manual for emergency operations shall include, where applicable:
- .1 description of fire-extinguishing systems and equipment;
 - .2 description of life-saving appliances and means of escape;
 - .3 description of the emergency power system and limiting conditions of operation;
 - .4 a list of key plans and schematics which may be useful during emergency situations;
 - .5 general procedures for deballasting or counterflooding and the closure of all openings which may lead to progressive flooding in the event of damage;
 - .6 guidance for the person in charge in determining the cause of unexpected list and trim and assessing the potential affects of corrective measures on unit survivability, i.e. strength, stability, buoyancy, etc.;
 - .7 special procedures in the event of an uncontrolled escape of hydrocarbons or hydrogen sulphide, including emergency shutdown;
 - .8 guidance on the restoration of mechanical, electrical and ventilation systems after main power failure or emergency shutdown; and

.9 ice alert procedures.

10.1.5 The information provided in the operating manuals shall, where necessary, be supported by additional material provided in the form of plans, manufacturers' manuals and other data necessary for the efficient operation and maintenance of the unit. Detailed information provided in manufacturers' manuals need not be repeated in the operating manuals. The information shall be referenced in the operating manual, readily identified, located in an easily accessible place on the unit and be available at all times.

10.1.6 Operating and maintenance instructions and engineering drawings for ship machinery and equipment essential to the safe operation of the unit shall be written in a language understandable by those officers and crew members who are required to understand such information in the performance of their duties.

10.2 Training manual and onboard training aids.

A training manual and onboard training aids complying with the relevant requirements of regs. II-2/15 and III/35 in SOLAS-74, as amended, shall be provided and relevant information made available to each person on board.

Requirements for type and schedule of training are given in Chapter 14 of the applicable MODU Code.

11 ATMOSPHERE TESTING INSTRUMENT FOR ENCLOSED SPACES

11.1 Each MODU and FOP for which the Safety Construction Certificates are issued in compliance with 1979, 1989 or 2009 MODU Codes shall carry an appropriate portable atmosphere testing instrument or instruments¹ from 01.07.2016. As a minimum, these shall be capable of measuring concentrations of oxygen, flammable gases or vapours, hydrogen sulphide and carbon monoxide prior to entry into enclosed spaces². Instruments carried aboard MODU and FOP under other requirements may satisfy this Regulation. Suitable means shall be provided for the calibration of all such instruments.

11.2 Such instruments shall be in addition to those provided with the unit's fire-fighter's outfits.

¹Refer to the Guidelines to facilitate the selection of portable atmosphere testing instruments for enclosed spaces as required by SOLAS regulation XI-1/7 (IMO Circular MSC.1/Circ.1477).

²Refer to the Revised recommendations for entering enclosed spaces aboard ships (IMO resolution A.1050(27)).

*ANNEX 45 (Reference)***45. METHODOLOGICAL RECOMMENDATIONS FOR FUEL, LUBRICATING OIL, OIL PRODUCT CARGO AND OILY WATER ANALYSES****1 GENERAL**

1.1 Methodological Recommendations for Fuel, Lubricating Oil, Oil Product Cargo and Oily Water Analyses¹ supplement the requirements of Sections 7 and 9, Part I "General Regulations for Technical Supervision" of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships and are used by Russian Maritime Register of Shipping² for recognition of the testing laboratories performing the analyses of ship fuels, lubricating oils, oil product cargo and oily waters to assess their technical competence and ability to carry out particular tests in the declared sphere of activity.

1.2 The Methodological Recommendations are intended for the testing laboratories recognized by the Register to provide the analyses of fuel oil and oily water samples in compliance with the requirements of Annexes I and VI to MARPOL 73/78, IMO resolutions MEPC.107(49), MEPC.60(33), MEPC.96(47) and other documents concerning prevention of environment pollution from ships, as well as the requirements of the Register and industry standards in assessment of the technical condition of ship items to be surveyed with respect to the necessity of submission byships the results of fuel, lubricating oil and oily water analyses.

To carryout analyses for determination of the bunker fuel oil quality conformance to the requirements of Annex VI to MARPOL 73/78 the shipowner submits samples taken in compliance with the requirements of Guidelines for the Sampling of Fuel Oil adopted by IMO resolution MEPC.96(47).

1.3 The Methodological Recommendations apply to all testing laboratories, irrespective of their legal form and form of ownership, that carry out analyses of ship oil products and oily waters for the items under the Register technical supervision.

1.4 The Methodological Recommendations are aimed at the operational support of the testing laboratories network recognized by the Register and improving the organizational and methodological basis of ship oil product and oily water analyses.

The Methodological Recommendations may be applied by testing laboratories for quality management system development and preparation of documents to obtain the RS recognition.

2 TERMS AND DEFINITIONS

2.1 For the purpose of these Methodological Recommendations the following terms and definitions have been adopted.

Official sample is a check sample to be used for arbitrary analysis.

Arbitrary analysis is determining conformity of oil product quality to the requirements of normative documents to be carried out by an independent laboratory in case of difficulties and differences arise between the customer and the supplier in relation to quality assessment. The independent laboratory is selected by agreement between the parties concerned. Arbitrary analysis may be witnessed by the persons concerned.

Bottom sample (according to GOST 2517-85) is a point sample of the oil product taken from the bottom of the reservoir (tank of a transportation facility) with a portable metal sampler

¹Hereafter referred to as "the Methodological Recommendations".

²Hereafter referred to as "the Register or RS".

which is lowered to the bottom. The bottom sample is not included in the combined sample and is analysed separately.

Accuracy control of oil product test is a combination of organizational arrangements, means and methods of test accuracy control of relevant item under test aimed at uniformity of measurement and the required metrological characteristics of testing procedures.

Check sample is a portion of basic, point or combined sample of oil product, which is used for the analysis.

Laboratory test (analysis) is an oil product check sample quality assessment for compliance with the requirements of the normative document which is performed under laboratory conditions using standard testing methods according to the list of quality characteristics established during accreditation.

Oil product is a finished product obtained by processing oil, gas condensate, hydrocarbons and chemical raw (synthetic gasoline).

Area of recognition is a list of activities performed which is established in the scope determined by the testing laboratory during preparation for the Register survey.

Combined sample (according to GOST 2517-85) is an oil product sample made up of several point samples taken in accordance with the relevant procedure and combined in prescribed proportion.

Basic sample (according to IMO Resolution MEPC.96(47)) is the representative sample of the fuel delivered to the ship collected throughout the bunkering period obtained by the sampling equipment positioned at the bunker manifold of the receiving ship.

Quality passport of oil product is the official accompanying document containing values of quality characteristics of the oil product obtained from laboratory tests performed by a competent body.

Oil product quality characteristic is a quantitative characteristic of one or more properties which determine oil product quality.

Commission analysis is the assessment of oil product quality conformance according to the established list of characteristics, grade and data given in supplier quality passport (during acceptance) or analysis log (during shipment), as well as in compliance with the requirements of the normative document on oil products.

Retained sample (according to IMO Resolution MEPC.96(47)) is a portion of basic sample which, on completion of the bunkering operations shall be retained under the ship's control.

Standard testing procedure is a test method for determination of oil products quality characteristic, as referred to in Section "Technical Requirements" of the normative document on a particular oil product grade. Where a test method is standardized, i. e. a standard of the type "Test Methods" is developed for it, the Section "Technical Requirements" includes a reference to the number of the relevant standard. Where the test method is not standardized, the Section "Technical Requirements" of the normative document on oil product contains full description of the test method with indication of its developer.

Representative sample (according to IMO Resolution MEPC.96(47)) is a fuel oil sample having its physical and chemical characteristics identical to the average characteristics of the total volume being sampled.

Point sample (according to GOST 2517-85) is a sample got by single taking. It characterizes the oil product quality in a particular area of the container unit (barrel, can/tank, etc.), or on a particular prescribed level in reservoir (transportation facility), or at a particular time during pipe sampling.

Express analysis is oil product quality assessment using express method. Results of express analysis shall not be used for presentation of claim, issuing an oil product quality passport or making an entry in the analysis log. Where it is demonstrated by the express analysis that the oil product quality is substandard, such data shall be checked by laboratory testing.

Express method is a test method to enable determination of an oil product quality characteristic with a predetermined probability degree and within a shorter time as compared to the standard method, and deciding on its verification under laboratory conditions.

3 ORGANIZATION OF TESTING LABORATORY ACTIVITIES

3.1 The activity of testing laboratories recognized by the Register shall be based on GOST R ISO/MEC 17025-2006 "General Requirements for the Competence of Testing and Calibration Laboratories".

The laboratories shall have the area of recognition established by the Recognition Certificate of Testing Laboratory, containing lists of tested products and testing methods, as well as lists of required measuring and testing equipment.

Testing laboratories independently establish the types of products to be tested and analyses to be made which shall be introduced into the area of recognition depending on the operational conditions and testing equipment.

The activity of recognized testing laboratories shall meet the requirements of the following basic documents approved as a result of the testing laboratory survey:

.1 Regulation on Testing Laboratory;

.2 Area of Recognition;

.3 Testing Laboratory Passport containing data necessary for testing in compliance with area of recognition;

.4 Quality Manual.

Simultaneously, the management of the testing laboratory approves Instructions on the Procedure of Sampling, Testing, Issuing of Testing Results.

The Instructions specify the following:

acceptance and identification procedure for samples received by the testing laboratory as well as their storage;

assignment issuing to personnel for sample testing;

testing procedure and issuing of test results;

order in which regulations and procedures to be found in the Quality Manual of Testing Laboratory are complied with;

forms of documents: reports, requests, sample logs, summary examination results logs;

test report forms;

document filing procedure;

tested samples storage procedure;

procedure for consideration of customer claims and corrective actions carried out by the testing laboratory;

sample recycling procedure after warranty expiration.

The above listed may also be specified in any other documentation complying with Section "Document Control" of GOST 17025-2006.

Recommended area of recognition for fuel oil, lubricating oil and oily water analyses is given in Tables 3.1-1, 3.1-2, 3.1-3.

Testing laboratories determine product types to be tested and analyses to be carried out proceeding from the operational conditions and availability of testing equipment.

4 FUEL OIL QUALITY CONTROL

4.1 The testing laboratories carry out tests (analyses) of bunker fuel oil and cargo fuel oil to determine compliance of the oil product quality characteristics with the current standards.

Oil fuel quality characteristics to be monitored are given in Table 4.1-1, and the list of normative documents on methods for fuel analysis is given in Table 4.1-2.

Bunker fuel oil analysis is carried out during the ship bunkering, when testing and setting the fuel oil preparation system. Cargo fuel oil analysis methods are similar to those of bunker fuel oil analysis.

Table 3.1-1

Recommended area of recognition of testing laboratories concerning fuel oil

Fuel oil to be tested	Code OKP/ TN VED Code	Tests and/or determined characteristics (parameters)	Normative documents on products with determined characteristics	(parameters)		
				Normative	documents	on testing
1 Distillate fuel						
1.1 Diesel fuel	02 5131		GOST 305-82			
1.2 Low-viscous marine fuel	02 5155		TU 38.101.567			
1.3 ISO-F (DMX, DMA, DMB, DMC)			TU 38.401-58-302-2001			
1.4 ISO-F (DMX, DMA, DMB, DMC)			ISO 8217:2005			
1.5 Fuel oil for gas-turbine plants	02 5195		GOST 10433-75			
1.6 Motor fuel for medium and low speed diesel engines	02 5221		GOST 1667-68			
1.7 Marine burner oil			TU 38.101.656			
2 Residual fuel oils						
2.1 Oil fuel. Mazut.	02 5210		GOST 10585-75			
2.2 ISO-F (RMA, RMB, RMD, RME, RMF, RMH, MK)	02 5211		TU 38.401-58-302-2001			
2.3 ISO-F (RMA, RMB, RMD, RME, RMF, RMH, MK)			ISO 8217:2005			
2.4 Highly viscous marine fuel	02 5213		TU 38.101-1314			
2.5 Marine fuels IFO-30, IFO-180, IFO-380			TU 0252-014-000-443 LUKOIL oil company			
		Cetane index		27768-88	4224:2007	D4737-09a
		Density, in kg/cm ³		3900-85	3675:1998	D1298-99 (2005)
				R 51069-97		D5002-99 (2005)
		Kinematic viscosity, in cSt		33-2000	3104:1994	D445-09
		Closed cup flash point, in °C		6356-75		D93-09
		Pour point, in °C		20287-91		D97-09
		Cloud point, in °C		5066-91		D2500-09
		Mass fraction of sulphur, in %		R 51947-2002	14596:2007	D4294-08
		Mass fraction of water-soluble acids and alkalies, in %		6307-75		
		Acidity, in mg KON/g		5985-79		D664-09a
		Ash content, in %		1461-75	6245:2001	D482-07
		Coking ability, in %		19932-99		D189-06e2
		Mass fraction of water, in %		R 51946-2002	3733:1999	D95-05
				2477-65		
		Filtering factor		19006-73		
		Mass fraction of mechanical admixtures, in %		6370-83		D4055-04 (2009)
		Lowest filtering temperature determined on cold filter, in %		22254-92	IP309	D6371-05
		Straight-run		R 50837.6-95		
		Stability and compatibility		R 50837.7-95		D4740-04 (2009)
		Distillation characteristics		2177-99		D86-09e1
		Chromaticity		20284-74		D1500-07
		Bacterial contamination		"EASICULT COMBI" non-standard method		

Table 3.1-2

Recommended area of recognition concerning marine oils

Fuel oil to be tested	Code OKP/ TN VED Code	Tests and/or determined characteristics (parameters)	Normative documents on products with determined characteristics (parameters)	Normative documents on testing methods		
				GOST	ISO	ASTM
1 Lubricating oils						
1.1 Motor oils for diesel engines	02 5335		GOST 12337-84 TU for particular products			
1.2 Universal motor and automobile carburetor engine oils	02 5314		GOST 10541-78			
1.3 Motor oils for motor and tractor diesel engines	02 5313		GOST 8581-78			
1.4 Petroleum turbine oils with dopes	02 5371		GOST 9972-74			
1.5 Turbine oils	02 5371		GOST 32-74			
1.6 Oil for marine gas-turbines	02 5371 02 5351		GOST 10289-79 GOST 1861-73			
1.7 Compressor oils	02 5360		GOST 23652-79			
1.8 Gear-box oils	02 5376		GOST 982-80			
1.9 Transformer oils	02 5341		GOST 20799-88			
1.10 Industrial oils	02 5373		GOST 5546-86			
1.11 Oils for refrigerating machines	02 5335		GOST 6794-75			
1.12 Oil AMG-10	02 5372		TU for particular products			
1.13 Hydraulic oils			TU for particular products			
1.14 Motor oils produced on the basis of manufacturer's standards (national and industry), imported oils			Manufacturer's specifications			
1.14.1 Groups SAE-20; 30; 40; 50		Density, in kg/cm ³		3900-85 R 51069-97	3675:1998	D1298-99 (2005) D5002-99 (2005)
1.14.2 All-season groups SAE 5W/40; 10W/30; 10W/40, etc.		Kinematic viscosity, in cSt Viscosity index Base number, in mg KOH/g Mass fraction of mechanical admixtures, in % Mass fraction of water, in % Open cup flash point, in °C Pour point, in °C Mass fraction of insoluble sediments, in % Neutralization number Sulfated ash, in % Demulsification time, in h Chromaticity Grade of purity		33-2000 25371-97 11362-76 6370-83 R 51946-2002 4333-87 20287-91 20684-75 11362-96 12417-94 12068-66 20284-74 17216-2001	3104:1994 3733:1999 3016:1994 6619:1988 4406:1999	D445-09 D2270-04 D4739-08el D4055-04 (2009) D95-05 D92-05a D97-09 D4739-08el D86-09el D1 500-07
2 Lubricating oils used in engine lubricating systems and other equipment (used oil products)	02 5892	Density, in kg/cm ³ Kinematic viscosity, in cSt Mass fraction of water, in % Mass fraction of insoluble sediments, in %	GOST 21046-86	3900-85 R 51069-97 33-82 2477-65 R 51946-2002 20684-75	3675:1998 3104:1994 3733:1999	D1298-99 (2005) D445-09 D95-09
		Aging: oil oxidation, contamination, degradation		ЯКУТ 26-002-2001		
		Grade of purity Chromaticity		17216-2001 20284-74	4406:1999	D1500-07

Table 3.1-3

Recommended area of recognition of testing laboratories concerning oily water analyses (tests)

Products to be tested	Tests	Normative documents on testing methods
Bilge and ballast water	Oil product (hydrocarbon) content, in ppm, in mg/dm ³	RD 31.04.20-97 RD 31.28.52-79 RD 31.27.43-81 GOST R 51797-2001 GOST R 52406-2005 ISO 9377-2:2000 ASTM D3921-96(2003)e1 Additional industry normative documentation: RD 52.24.476-93

Table 4.1-1

Quality characteristics of oil fuel to be monitored

Type of oil product	Analysis for compliance with normative documents (GOST, TU, manufacturer's specification)	Performance analysis	Notes
1 Distillate fuel (DMA, DMB, DMC, TMC), diesel fuel, burner oil	1. Density at 15 °C, in kg/cm ³ 2. Kinematic viscosity at 50 °C, in cSt 3. Mass fraction of water and mechanical admixtures, in % 4. Closed cup flash point, in °C 5. Mass fraction of sulphur, in % 6. Fuel appearance	1. Density at 15 °C, in kg/cm ³ 2. Kinematic viscosity at 50 °C, in cSt 3. Mass fraction of water and mechanical admixtures, in % 4. Closed cup flash point, in °C 5. Mass fraction of sulphur, in % 6. Pour point, in °C 7. Cloud point, in °C 8. Ash content, in % 9. Coking ability of 10 % of carbon residue, in % 10. Conradson coking ability, in % 11. Distillation characteristics 12. Cetane index 13. Acid number, in mg KOH/g 14. Filtering factor 15. Lowest filtering temperature	For diesel fuel GOST 305-82 at 20 °C For diesel fuel GOST 305-82 at 20 °C For DMA and diesel fuel For DMB, DMC For DMB, DMC and burner oil
2 Residual fuel oil (RMA, RMB, RMD, RME, RMF, RMG); Mazut (GOST 10585-99)	1. Density at 15 °C, in kg/cm ³ 2. Kinematic viscosity at 50 °C, in cSt 3. Mass fraction of water and mechanical admixtures, in % 4. Closed cup flash point, in °C 5. Mass fraction of sulphur, in % 6. V, Al, Si, Na, content, in % 7. Mass fraction of water-soluble acids and alkalies, in %	1. Density at 15 °C, in kg/cm ³ 2. Kinematic viscosity at 50 °C, in cSt 3. Mass fraction of water and mechanical admixtures, in % 4. Closed cup flash point, in °C 5. Pour point, in °C 6. Mass fraction of sulphur, in % 7. Ash content, in % 8. Total sediment (hot filtration), in % 9. Conradson coking ability, in % 10. V content, in % 11. Al + Si content (catalyst fines), in % 12. Stability and compatibility 13. Pollution by used lubricating oil (zinc, phosphorus and calcium content), in % 14. Water-soluble acids and alkalies 15. Heat value 16. Design aromatics index CCAI	Design values

Table 4.1-2

Normative documents on methods for fuel analyses

Nos.	Parameter (Characteristic)	Method	Updating
1	Density measured by hydrometer	GOST 3900-85. Petroleum and petroleum products. Methods for determination of density	
		GOST R 51069-97. Crude petroleum and petroleum products. Determination of density, relative density and API gravity. Hydrometer method	
		ASTM D1298-99. Standard test method for density, relative density (specific gravity), or API gravity of crude petroleum and liquid petroleum products by hydrometer method	
		ISO 3675:1998. Crude petroleum and liquid petroleum products. Laboratory determination of density. Hydrometer method	
2	Density measured by density analyzer	ASTM D5002-99. Standard test method for density and relative density of crude oils by digital density analyzer	
		ISO 12185:1996. Crude petroleum and petroleum products. Determination of density. Oscillating U-tube method	
3	Viscosity	GOST 33-2000. Petroleum products. Transparent and opaque liquids. Determination of kinematic viscosity and calculation of dynamic viscosity	
		ASTM D445-01. Standard test method for kinematic viscosity of transparent and opaque liquids (the calculation of dynamic viscosity)	
		ISO 3104:1994. Petroleum products. Transparent and opaque liquids. Determination of kinematic viscosity and calculation of dynamic viscosity	
		GOST 1929-87. Petroleum products. Methods of test for determination of dynamic viscosity by rotary viscosimeter	
		GOST 6258-85. Petroleum products. Method for determination of assumed viscosity	
4	Closed cup flash point	GOST 6356-75. Petroleum products. Method of test for flash point by closed cup	
		ASTM D93-00. Standard test methods for flash-point by Pensky-Martens closed cup tester	
		ISO 2719:2002. Determination of flash point. Pensky-Martens closed cup method	
5	Open cup flash point	GOST 4333-87. Petroleum products. Methods for determination of flash and ignition points in open crucible	
		ASTM D92-01. Standard test method for flash and fire points by Cleveland open cup	
		ISO 2592:2000. Determination of flash and fire points. Cleveland open cup method	
6	Water content	GOST 2477-65. Petroleum and petroleum products. Method for determination of water content	
		GOST R 51946-2002. Petroleum products and bituminous materials. Method for determination of water by distillation	
		ASTM D95-99. Standard test method for water in petroleum products and bituminous materials by distillation	
		ISO 3733:1999. Petroleum products and bituminous materials. Determination of water. Distillation method	
7	Cloud point	GOST 5066-91. Motor fuels. Methods for determination of cloud, chilling and freezing points	
		ASTM D2500-09. Standard test method for cloud point of petroleum products	
		ISO 3015:1992. Petroleum products. Determination of cloud point	
8	Pour point	GOST 20287-91. Petroleum products. Methods of test for flow point and pour point	
		ASTM D97-02. Standard test method for pour point of petroleum products	
		ISO 3016:1994. Petroleum products. Determination of pour point	
9	Lowest filtering temperature	GOST 22254-92. Diesel fuels. Cold filter method for determination of lowest filtering temperature	
		ASTM D6371-99. Standard test method for cold filter plugging point of diesel and heating fuels	
		IP 309/99. Diesel and domestic heating fuels. Determination of cold filter plugging point.	

Table 4.1-2 — continued

Nos.	Parameter (Characteristic)	Method	Updating
10	Sulphur content	GOST R 51947-2002. Petroleum and petroleum products. Determination of sulphur by method of energy-dispersive X-ray fluorescence spectrometry	
		GOST R 50442-92. Petroleum and petroleum products. X-ray fluorescence method for determination of sulphur content	
		GOST 3877-88. Petroleum products. Determination of sulfur by calorimetric bomb method	
		GOST 1437-75. Dark petroleum products. Accelerated method for determination of sulphur	
		ASTM D4294-08. Standard test method for sulfur in petroleum and petroleum products by energy-dispersive X-ray fluorescence spectroscopy	
		ISO 8754:2003. Petroleum products. Determination of sulfur content. Energy-dispersive X-ray fluorescence spectrometry	
11	Ash content	GOST 1461-75. Petroleum and petroleum products. Method of ash test	
		ASTM D482-03. Standard test method for ash from petroleum products	
		ISO 6245:2001. Petroleum products. Determination of ash	
12	Coking ability	GOST 19932-99. Petroleum products. Determination of carbon residue. Conradson method	
		ASTM D189-01. Standard test method for Conradson carbon residue of petroleum products	
		ISO 6615:1993. Petroleum products. Determination of carbon residue. Conradson method	
13	Hot filtration sediment	GOST R 50837.6-95. Residual fuel oils. Test for straight-run. Method for determination of total sediment	
		ASTM D4870-09. Standard test method for determination of total sediment in residual fuels	
		ISO 10307:1993. Petroleum products. Total sediment in residual fuel oils — Part 1: Determination by hot filtration. Part 2: Determination using standard procedure for ageing	
14	Stability and compatibility	GOST R 50837.7-95. Residual fuel oils. Test for straight-run. Method for determination of stability and compatibility by spot	
		ASTM D4740-04(2009). Standard test method for stability and compatibility of residual fuels by spot test	
15	Straight-run of residual oils	GOST R 50837.3-95. Residual fuel oils. Test for straight-run. Method for determination of toluene equivalent	
		GOST R 50837.4-95. Residual fuel oils. Test for straight-run. Method for determination of xylene equivalent	
16	Oil products distillation characteristics	GOST 2177-99. Petroleum products. Methods for determination of distillation characteristics	
		ASTM D86-03. Standard test method for distillation of petroleum products at atmospheric pressure	
		ISO 3405:2000. Petroleum products. Determination of distillation characteristics at atmospheric pressure	
17	Mechanical admixtures	GOST 6370-83. Petroleum, petroleum products and additives. Method for determination of mechanical admixtures	
18	Filtering factor	GOST 19006-73. Motor fuel. Method for determination of the filtering factor	
19	Acid number determined by potentiometric titration method	GOST 11362-96. Petroleum products and lubricants. Neutralization number. Potentiometric titration method	
		ASTM D664-01. Standard test method for acid number of petroleum products by potentiometric titration	
		ISO 6619:1988. Petroleum products and lubricants. Neutralization number. Potentiometric titration method	
20	Acidity and acid number with colour indicator titration method	GOST 5985-79. Petroleum products. Method for determination of acidity and acid number	
		GOST 29255-91. Petroleum products and lubricating oils. Neutralization number. Colour indicator titration method	
		ASTM D974-08. Standard test method for acid and base number by colour-indicator titration	
		ISO 6618:1997. Petroleum products and lubricants. Determination of acid or base number. Colour-indicator titration method	
21	Water-soluble acids and alkalis	GOST 6307-75. Petroleum products. Method of test for water-soluble acids and alkalis	
22	Corrosion — copper strip test	GOST 6321-92. Engine fuels. Method for copper strip test	
		ASTM D130-94(2000)e1. Standard test method for detection of copper corrosion from petroleum products by the copper strip tarnish test	
		ISO 2160:1998. Petroleum products. Corrosiveness to copper. Copper strip test	

Table 4.1-2 — continued

Nos.	Parameter (Characteristic)	Method	Updating
23	Colour of oil products	GOST 20284-74. Petroleum products. Method for determination of colour on colourimeter IIHT	
		ASTM D1500-98. Standard test method for ASTM colour of petroleum products (ASTM colour scale)	
		ISO 2049:1996. Petroleum products. Determination of colour (ASTM scale)	
24	Iodine number and unsaturation	GOST 2070-82. Light petroleum products. Methods for determination of iodine numbers and content of unsaturated hydrocarbons	
25	Bacterial contamination	Easicult Combi. Test for bacteria, yeasts and fungi	
26	Chloride salts content	GOST 21534-76. Petroleum. The determination of chloride salts content	
		ASTM D4929-99. Standard test methods for determination of organic chloride content in crude oil	
		ISO 15597:2001. Petroleum and related products. Determination of chlorine and bromine content. Wave length-dispersive X-ray fluorescence spectrometry	
27	Cetane index	GOST 27768-88. Diesel fuel. Determination of cetane index by calculation method	
		ASTM D4737-09a. Standard test method for calculated cetane index by four variable equation	
		ISO 4264:1995. Petroleum products. Calculation of cetane index of middle-distillate fuels by the four-variable equation	
28	Calorific value	GOST 21261-91. Oil products. Method for the determination of gross calorific value and calculation of net calorific value	
29	Metals in oil products (RFS ¹)	ASTM D4927-05. Standard test methods for elemental analysis of lubricant and additive components — barium, calcium, phosphorus, sulfur, and zinc by wave length-dispersive X-ray fluorescence spectroscopy	
		ISO 14597:1997. Petroleum products. Determination of vanadium and nickel content. Wave length-dispersive X-ray fluorescence spectrometry	
30	Metals in oil products (AAS ²)	ASTM D5863-00a(2005). Standard test methods for determination of nickel, vanadium, iron, and sodium in crude oils and residual fuels by flame atomic absorption spectrometry	
31	Aluminium and silicon in fuel oil (AAS ²)	ISO 10478:1994. Petroleum products. Determination of aluminium and silicon in fuel oils. Inductively coupled plasma emission and atomic absorption spectroscopy methods	
		IP 377-95. Method for determination of aluminium and silicon in mazut by flame atomic absorption spectrometry	
32	Polypropylene in oil products	Saybolt Qualit SAM 1001/98/03. Determination of polypropylene in residual fuels by Fourier transform infrared spectroscopy (FTIR)	
33	Saturated vapors pressure	GOST 1756-2000. Petroleum products. Determination of saturated vapors pressure	
		ASTM D323-08. Standard test method for vapour pressure of petroleum products (Reid method)	
		ISO 3007:1999. Petroleum products and crude petroleum. Determination of vapour pressure. Reid	
¹ RFS — X-ray fluorescence spectrometry.			
² AAS — atomic absorption spectrometry.			

The aim of bunker fuel oil analysis is to check the bunker fuel oil quality characteristics conformity to quality passport data or to the characteristics of the oil ordered by the shipowner.

The quality passport shall be issued by the fuel supply organization (fueller vessel) proceeding from the analyses of a particular fuel delivery carried out by the laboratory of the oil delivery terminal, shipowner, port, survey company, and not proceeding from the quality passport issued by the fuel oil manufacturer.

During the bunker operations in compliance with the provisions of IMO Resolution MEPC.96(47), the basic sample being actually a representative sample of the fuel delivered shall be drawn at the receiving ship's inlet bunker manifold.

The basic sample shall be divided in three samples. Two samples are sealed and used in compliance with IMO Resolution MEPC.96(47). One of retained samples shall be kept onboard until the delivered fuel oil is consumed, but in any case for a period of not less than 12 months from the time of delivery. This sample is used as an official sample if a claim is laid against the fuel supplier. The second sealed retained sample is stored by the fuel supplier (fueller vessel or oil delivery terminal).

The third sample is used as a check one for verification of fuel quality using express methods. When in doubt concerning the bunker fuel oil quality or where fuel quality non-conformance to the quality passport characteristics is revealed by the express method, the sample shall be sent to the testing laboratory recognized by the Register for analysis within the scope of normative documentation requirements for the particular fuel.

Results of sampling are documented with appropriate Sampling Reports. The Sampling Report is drawn up in two copies, where data for identification of received fuel is stated including the information on fuel name and fuel supplier, location at which the sample was drawn, type of analysis or list of quality characteristics to be determined for the particular sample. The Sampling Report is signed by parties involved in bunker operations.

On customer's request the testing laboratories may conduct analyses of other specific types of samples, i.e. point samples, combined samples and bottom samples taken in compliance with the requirements of GOST 2517-85.

All analyses and tests are carried out in compliance with the area of recognition of the laboratory on the basis of ISO and GOST standards, Technical Specifications or by other methods recommended by the normative documents. Results of sample analyses and tests shall be documented with Test Reports.

The Conclusion on the fuel quality is issued based on the comparison of values of physical and chemical properties (characteristics) obtained by sample analysis with the values stipulated by standards.

5 OIL QUALITY CONTROL

5.1 Analyses of incoming oil samples are carried out by the RS recognized testing laboratories which perform tests for the following purposes:

- to determine conformance of new oil quality to normative documents;
- to determine quality of oils used in the ship systems, machinery and equipment in operation;
- for condition monitoring of ship facilities being the items of survey system on the basis of technical condition assessment.

Sampling of lubricating oils is carried out by an authorized representative of the ship or a laboratory specialist in compliance with the rules specified by the relevant instruction. Documentation accompanying the sample shall be sufficient to determine the aim of analysis and interpretation of the analysis results.

All the analyses and tests are carried out in compliance with the area of recognition of the testing laboratory according to ISO, GOST, ASTM standards or other methods recommended by normative documents. Results of sample analyses and tests are documented with Test Reports.

Conclusion on the lubricating oil quality is issued based on the comparison of physical and chemical characteristics obtained by sample analysis with the specified GOST standards, TU (technical specifications), manufacturers' specifications or defect criteria.

Lubricating oil quality characteristics to be monitored are given in Table 5.1-1; list of normative documents is given in Table 5.1-2.

Methods of analyses and normative documents given in Tables 5.1-1 and 5.1-2 are recommendatory. In selecting methods of analyses the standards (requirements) on the products to be tested and the laboratory possibilities are recommended to follow.

Table 5.1-1

Lubricating oil quality characteristics to be monitored

Type of lubricating oil	Analysis for compliance with normative documents (GOST, TU, manufacturers' specification)	Performance analysis	Notes
1 Motor oils	1. Density at 20 °C, in kg/cm ³ 2. Kinematic viscosity at 40 °C and 100 °C, in cSt 3. Viscosity index (design) 4. Base number, in mg KOH/g 5. Sulphated ash, in % 6. Flash point, in °C	1. Density at 20 °C, in kg/cm ³ 2. Kinematic viscosity at 40 °C and 100 °C, in cSt 3. Alkali neutralization number, in mg KOH/g 4. Sulphated ash, in % 5. Flash point, in °C 6. Mass fraction of water, in % 7. Mass fraction of mechanical admixtures, in % 8. Ageing: oxidation, contamination and degradation of additives 9. Content of wear metals	For imported oils at 15 °C In special cases + acid number Fourier transform infrared spectroscopy (FTIR) Methods: RFS ¹ , AAS ² , ferrography
2 Industrial oils: turbine oil, compressor oil, hydraulic oil, reduction gear oil, gear-box oil, etc.	1. Density at 20 °C (15 °C), in kg/cm ³ 2. Kinematic viscosity at 40 °C and (50 °C), in cSt 3. Open cup flash point, in °C 4. Mass fraction of water, in % 5. Mass fraction of mechanical admixtures, in % 6. Ash content, in % bymass 7. Pour point, in °C 8. Demulsification time, in h 9. Acid number, in mg KOH/g 10. Infrared spectrum for determination of oil type (mineral, synthetic), etc.	1. Density at 20 °C, in kg/cm ³ 2. Kinematic viscosity at 40 °C and (50 °C), in cSt 3. Viscosity index (design) 4. Open cup flash point, in °C 5. Mass fraction of water, in % 6. Mass fraction of mechanical admixtures, in % 7. Ash content, in % bymass 8. Pour point, in °C 9. Demulsification time, in h 10. Acid number, in mg KOH/g 11. Grade of purity 12. Colour 13. Ageing: oxidation and degradation of additives 14. Content of elements: chlorine, phosphorus, sulphur, zinc 15. Chloride content 16. Content of wear metals	For high-viscosity oils at 40 °C and 100 °C For turbine oils FTIR method Methods: RFS ¹ , AAS ² , ferrography
¹ RFS — refer to Footnote 1 in Table 4.1-2. ² AAS — refer to Footnote 2 in Table 4.1-2.			

Table 5.1-2

Normative documents on methods for oil analyses

Nos.	Parameter (Characteristic)	Method	Updating
1	Density measured by hydrometer	GOST 3900-85. Petroleum and petroleum products. Methods for determination of density	
		GOSTR 51069-97. Crude petroleum and petroleum products. Determination of density, relative density and API gravity. Hydrometer method	
		ASTM D1298-99. Standard test method for density, relative density (specific gravity), or API gravity of crude petroleum and liquid petroleum products by hydrometer method	
		ISO 3675:1998. Crude petroleum and liquid petroleum products. Laboratory determination of density. Hydrometer method	
2	Density measured by density analyzer	ASTM D5002-99. Standard test method for density and relative density of crude oils by digital density analyzer	
		ISO 12185:1996. Crude petroleum and petroleum products. Determination of density. Oscillating U-tube method	
3	Viscosity	GOST 33-2000. Petroleum products. Transparent and opaque liquids. Determination of kinematic viscosity and calculation of dynamic viscosity	
		ASTM D445-01. Standard test method for kinematic viscosity of transparent and opaque liquids (the calculation of dynamic viscosity)	
		ISO 3104:1994. Petroleum products. Transparent and opaque liquids. Determination of kinematic viscosity and calculation of dynamic viscosity	
		GOST 1929-87. Petroleum products. Methods of test for determination of dynamic viscosity by rotary viscosimeter	
		GOST 6258-85. Petroleum products. Method for determination of assumed viscosity	
4	Viscosity index	GOST 25371-97. Petroleum products. Calculation of viscosity index from kinematic viscosity	
		ASTM D2270-04. Standard practice for calculating viscosity index from kinematic viscosity at 40 and 100 °C	
		ISO 2909:2002. Petroleum products. Calculation of viscosity index from kinematic viscosity	
5	Closed cup flash point	GOST 6356-75. Petroleum products. Method of test for flash point by closed cup	
		ASTM D93-00. Standard test methods for flash-point by Pensky-Martens closed cup tester	
		ISO 2719:2002. Determination of flash point. Pensky-Martens closed cup method	
6	Open cup flash point	GOST 4333-87. Petroleum products. Methods for determination of flash and ignition points in open crucible	
		ASTM D92-01. Standard test method for flash and fire points by cleveland open cup	
		ISO 2592:2000. Determination of flash and fire points. Cleveland open cup method	
7	Water content	GOST 2477-65. Petroleum and petroleum products. Method for determination of water content	
		GOST R 51946-2002. Petroleum products and bituminous materials. Method for determination of water by distillation	
		ASTM D1533-00(2005). Standard test method for water in insulating liquids by coulometric Karl Fischer titration	
		ASTM D95-99. Standard test method for water in petroleum products and bituminous materials by distillation	
		ISO 3733:1999. Petroleum products and bituminous materials. Determination of water. Distillation method	
8	Pour point	GOST 20287-91. Petroleum products. Methods of test for flow point and pour point	
		ASTM D97-02. Standard test method for pour point of petroleum products	
		ISO 3016:1994. Petroleum products. Determination of pour point	
9	Ash content	GOST 1461-75. Petroleum and petroleum products. Method of ash test	
		ASTM D 482-03. Standard Test Method for Ash from Petroleum Products	
		ISO 6245:2001. Petroleum products. Determination of ash	
10	Sulphated ash	GOST 12417-94. Petroleum products. Method for determination of sulphated ash	
		ASTM D874-07. Standard test method for sulfated ash from lubricating oils and additives	
		ISO 3987:1994. Petroleum products. Lubricating oils and additives. Determination of sulphated ash	
11	Mechanical admixtures	GOST 6370-83. Petroleum, petroleum products and additives. Method for determination of mechanical admixtures	

Table 5.1-2 — continued

Nos.	Parameter (Characteristic)	Method	Updating
12	Mechanical admixtures detected by membrane filtration	ASTM D4055-04(2009). Standard test method for pentane insolubles by membrane filtration	
		MOBIL 1068-79. Determination of pentane insolubles in used marine lubricating oils	
13	Insoluble sediment determined by centrifugation	GOST 20684-75. Used motor oils. Method for determination of insoluble sediments	
		ASTM D893-97(2002)e1. Standard test method for insolubles in used lubricating oils	
14	Acid number determined by determined by potentiometry	GOST 11362-96. Petroleum products and lubricants. Neutralization number. Potentiometric titration method	
		ASTM D664-01. Standard test method for acid number of petroleum products by potentiometric titration	
		ISO 6619:1988. Petroleum products and lubricants. Neutralization number. Potentiometric titration method	
15	Base number determined by potentiometry	GOST 11362-96. Petroleum products and lubricants. Neutralization number. Potentiometric titration method	
		ASTM D2896-98. Standard test method for base number of petroleum products by potentiometric perchloric acid titration	
		ASTM D4739-08e1. Standard test method for base number determined by potentiometric hydrochloric acid titration	
		ISO 6619:1988. Petroleum products and lubricants. Neutralization number. Potentiometric titration method	
16	Acid and base number with colour indicator	GOST 5985-79. Petroleum products. Method for determination of acidity and acid number	
		GOST 29255-91. Petroleum products and lubricating oils. Neutralization number. Colour indicator titration method	
		ASTM D974-08. Standard test method for acid and base number by colour-indicator titration	
		ISO 6618:1997. Petroleum products and lubricants. Determination of acid or base number. Colour-indicator titration method	
17	Corrosion on metals	GOST 20502-75. Oils and additives to them. Methods for determination of corrodibility	
		GOST 2917-76. Oils and additives. Method of test for corrosion influence on metals	
18	Colour of oil products	GOST 20284-74. Petroleum products. Method for determination of colour on colorimeter IIHT	
		ASTM D1500-98. Standard test method for ASTM colour of petroleum products (ASTM colour scale)	
		ISO 2049:1996. Petroleum products. Determination of colour (ASTM scale)	
19	Iodine number and unsaturation	GOST 2070-82. Light petroleum products. Methods for determination of iodine numbers and content of unsaturated hydrocarbons	
20	Saponification number	GOST 17362-71. Mineral oils. Method of determination of saponification number	
		ASTM D94-07. Standard test methods for saponification number of petroleum products	
		ISO 6293-1:1996. Petroleum products. Determination of saponification number. Part 1: Colour indicator titration method	
21	Demulsification time	GOST 12068-66. Mineral oils. Method for determination of demulsification time	
		ASTM D1401-09. Standard test method for water separability of petroleum oils and synthetic fluids	
22	Grades of liquids purity	GOST 17216-2001. Industrial cleanliness. Grades of liquids purity	
		ISO 4406:1999. Hydraulic fluid power. Fluids. Method for coding the level of contamination by solid particles	
23	Infrared Fourier spectroscopy (FTIR)	ASTM E2412-04. Practice for condition monitoring of used lubricants by trend analysis using Fourier transform infrared (FT-IR) spectrometry	
		DIN 51451:2004-09. Testing of petroleum products and related products. Analysis by infrared spectrometry. General working principles	
		DIN 51452:1994-01. Testing of lubricants. Determination of the soot content in used diesel engine oils. Infrared spectrometry	
		DIN 51453:2004-10. Testing of lubricants. Determination of oxidation and nitration of used motor oils. Infrared spectrometric method	
		GOST 28640-90. Mineral electrical insulating oils. Method for determination of aromatic hydrocarbons	

Table 5.1-2 — continued

Nos.	Parameter (Characteristic)	Method	Updating
24	Metals and non-metals in oil products (RFS)	ASTM D4927-05. Standard test methods for elemental analysis of lubricant and additive components — barium, calcium, phosphorus, sulfur, and zinc by wave length-dispersive X-ray fluorescence spectroscopy	
		ISO 14597:1997. Petroleum products. Determination of vanadium and nickel content. Wave length-dispersive X-ray fluorescence spectrometry	
25	Metals in oil products (AAS)	ASTM D5863-00a(2005). Standard methods for determination of nickel, vanadium, iron and sodium in crude oils and residual fuels by atomic absorption spectrometry	
26	Drop point	GOST 6793-74. Petroleum products. Method of drop point determination	
		ASTM D566-02(2009). Standard test method for dropping point of lubricating grease	
		ISO 2176:1995. Petroleum products. Lubricating grease. Determination of dropping point	
27	Penetration	GOST 5346-78. Plastic lubricants. Methods for determination of penetration with the conical penetrometer	
		ASTM D217-02(2007). Standard test methods for cone penetration of lubricating grease	
		ISO 2137:1985. Petroleum products. Lubricating grease and petrolatum. Determination of cone penetration	

6 OILY WATER ANALYSIS

6.1 Oily water analyses are carried out by testing laboratories recognized by the Register.

Oily water quality characteristics to be monitored are given in Table 6.1-1. List of normative documents on oilywater methods of analysis is given in Table 6.1-2.

Table 6.1-1

Oily water quality characteristics to be monitored and testing equipment

Product to be tested	Test	Quality standards, in mg/dm ³ , not more than	Method	Testing equipment
Bilge and ballast water	Content of oily products (hydrocarbons), in ppm, in mg/dm ³	15	RD 31.28.52-79 RD 31.27.43-81 RD 31.04.20-97 ASTM D3921-96(2003)e1 GOST R 51797-2001 ISO 9377-2:2000 RD 52.24.476-93	FTIR spectrometer Gas chromatograph IR-photometric analyzer

Table 6.1-2

Normative documents on methods for oily water analyses

Nos.	Parameter (Characteristic)	Method	Updating
1	Oil products content in water determined by IR-spectroscopy	GOST R 51797-2001. Drinking water. Method for determination of oil products content	
		ASTM D3921-96(2003)e1. Standard test method for oil and grease and petroleum hydrocarbons in water	
		RD 31.28.52-79. Methods for physical and chemical control of ship equipment working media.	
		RD 31.27.43-84. Instructions on determination of oil and oil products content in different ship water using IR-spectrophotometry	
		RD 31.04.20-97. Programme for onboard testing of oily-water filtering equipment and 15ppm bilge alarm	
2	Oil products content in water determined by gas chromatography	GOST R 52406-2005. Water. Determination of oil products using gas chromatography	
		ISO 9377-2:2000. Determination of oil hydrocarbon index. Part 2. Method using solvent extraction and gas chromatography	

On ships oily water sampling is made by the ship crew in compliance with the Register rules and requirements of RD 31.04.20-97 "Programme for onboard testing of oily-water filtering equipment and 15 ppm bilge alarm". Samples are delivered to the laboratory together with the shipboard Sampling Report with identification of filtering equipment type and signature of the authorized persons (chief engineer officers).

During the acceptance tests of filtering equipment and arrangement for prevention of pollution from ships, the sampling is witnessed by representatives of the Register and, where necessary, of the testing laboratory, and in consequence of which a Report is drawn up.

The sampling analysis is performed in compliance with the requirements of MEPC.107(49) or MEPC.60(33), whichever is applicable.

The results of analysis are recorded in Test Report by the testing laboratory.

7 LABORATORY TESTING AND MEASURING EQUIPMENT AND STATE STANDARD SAMPLES

7.1 A basic list of testing equipment (TE), measuring equipment (ME) and state standard samples (SSS) necessary to perform tests of oil products (fuel oil and lubricating oils) and oily waters is given in Tables 7.1-1, 7.1-2 and 7.1-3. The testing laboratory shall be provided with TE, ME and SSS to perform tests within the area of recognition.

Table 7.1-1

Recommended list of TE for the testing laboratory recognized by the Register

Nos.	Name of tested product. Product characteristics to be determined	Name of TE, type	Basic technical characteristics		Recommended equipment
			Measuring range	Measuring accuracy	
1	Density, in kg/m ³ , and kinematic viscosity, in cSt, determined at different temperature (20, 40, 50 and 100 °C)	Liquid thermostat	20 — 150 °C	0,1 °C	Thermostat types: VIS-T-07, VIS-T-01, VT-17-02. Manufactured by TERMEX, Ltd., Russia
2	Density, in kg/m ³	Digital density meter	0 — 3 g/cm ³	0,0001	VIP-2M. Manufactured by TERMEX Ltd., Russia
3	Mass fraction of water, in % by volume	Distillation apparatus for determination of water content in oil	0,03 — 10 % by volume	0,03	Distillation apparatus AKOV-10
4	Closed cup flash point, in °C	Apparatus for determination of flash point and ignition point in a closed cup	12 — 360 °C	1 °C	Type TVZ, Russia Type TV, Russia
5	Open cup flash point, in °C	Apparatus for determination of flash point and ignition point in an open cup			
6	Neutralization number, in mg KOH/g; TBN, in mg KOH/g; total acid number (TAN), in mg KOH/g	Laboratory ESL-43-07 glass electrode. Auxiliary EVL-1MZ. 1 silver-chloride electrode	0 — 12 0 — 12	0,2 0,2	ATP-01 and ATP-02 automated titrator manufactured by AQUILON, CJSC, Russia, or another apparatus meeting the technical requirements
7	Pour point, in °C; Cloud point, in °C	Low-temperature liquid thermostat	−80 to +120	0,2	KRIO-VT-05-01 thermostat. Manufactured by TETREX Ltd., Russia, or another apparatus meeting the GOST requirements
8	Ash content, in % by weight; sulphated ash, in %	Muffle furnace	150 — 1160 °C	2,5 °C	Type MIMP-34 (SNO-1,7,2,5,6 (11/5-IG). Manufactured by SZNPT Ltd., Russia, or another apparatus meeting the technical requirements
9	Mechanical admixtures, in % by weight; total residue, in % by weight	Drying electric box	70 — 350 °C	1 °C	Type SNOL-3,5,3.3,5/3-IM, Russia, or another apparatus meeting the technical requirements
10	Conradson coking characteristics, in % by weight	Apparatus for determination of coking ability determining carbon residue	0,01 — 10	0,03	Conradson apparatus
11	Distillation characteristics, in °C	Apparatus for determination of distillation characteristics at atmospheric pressure	35 — 37 °C	1 °C	Type ARKS. Manufactured by Neftekhimanalit CJSC, Russia
12	Mass fraction of sulphur, in %	Sulphur analyzer	0,02 — 0,1 0,1 — 5,0	0,0005	X-ray fluorescence analyzer meeting the technical requirements

Table 7.1-1 — continued

Nos.	Name of tested product. Product characteristics to be determined	Name of TE, type	Basic technical characteristics		Recommended equipment
			Measuring range	Measuring accuracy	
13	Content of vanadium, aluminium, silicon and equipment component wear metal particles, in mg/kg (ppm)	Spectrometer	V — 2—500 ppm Al — 5—500 Si — 10—500 Metals: > 5	2 ppm	Spectrometers: X-ray fluorescence atomic absorption, etc.
14	Bilge water, ballast water. Oil product content, in mg/dm ³	IR-photometric analyzer. Gas chromatograph	0,5—2000	0,05 mg/dm ³	FTIR spectrometer FSM-1201
15	Oil products. Waste lubricating oil. Ageing and oxidation, in abs/cm	IR-spectrometer	0—20 abs/cm		FTIR spectrometer meeting the technical requirements
16	Lubricating oils, hydraulic oils. Wear products, in mg/kg (ppm); number of	Ferrograph	1—1000 ppm 1—250 particles/cm ³	1 ppm	Ferrograph: direct reading (DR) analytical

Table 7.1-2

Recommended list of ME for the testing laboratory recognized by the Register to perform fuel, lubricating oil and oily water analyses

Nos.	Product characteristics to be determined	Name of ME, type (model)	Basic technical characteristics	
			Measuring range	Measuring accuracy
1	Density, in kg/m ³	Hydrometer ATN-2 ATN-2	830 — 910 910 — 990	+ 0,5 + 0,5
2	Kinematic viscosity, in cSt	Capillary viscosimeter VNZh VPZh	Ø1,41 Ø1,91 Ø1,77 Ø1,31 Ø2,37	
3	Temperature, in °C	Glass thermometer TN-1 TN-2M TN-4 TL-4 TN-4M TL-4 TN-7 TN-8 TIN 10-8 TIN 10-1 TIN 10-4 TIN 10-3	0 — 170 0 — 260 0 — 150 0 — 50 0 — 150 50 — 150 0 — 360 —80 to +60 38,6 — 41,4 8,6 — 21,4 98,6 — 101,4 48,6 — 51,4	+ 1,0 ± 1,0 ± 1,0 ± 0,1 ± 1,0 ± 0,2 ± 1,0 ± 0,1 ± 0,1 ± 0,1 ± 0,1
4	Time, in s	CITIZEN Digital Stopwatch	1 — 1000	± 0,01
5	Mass, in g	Electronic laboratory balance	0,0002 — 200	± 0,0002
6	Mass, in g	Universal electronic counter balance	0,02 — 150	± 0,1
7	Volume, in ml	Trap receivers 2,0 ml 5,0 ml 10,0 ml	0,05 — 2,0 0,1 — 5,0 0,03 — 10,0	± 0,05 ± 0,1 ± 0,03
8	Volume, in ml	Measuring pipette 2,0 ml 5,0 ml 10,0 ml	0,02 — 2,0 0,05 — 5,0 0,1 — 10,0	± 0,02 ± 0,005 ± 0,1

Table 7.1-2 — continued

Nos.	Product characteristics to be determined	Name of ME, type (model)	Basic technical characteristics	
			Measuring range	Measuring accuracy
9	Volume, in ml	Volumetric flask		
		50,0 ml	50,0	$\pm 0,12$
		100,0 ml	100,0	$\pm 0,20$
		500,0 ml	500,0	$\pm 0,5$
		1000,0 ml	1000,0	$\pm 0,8$
10	Volume, in ml	Cylinder		
		10,0 ml	0,2 — 10,0	$\pm 0,2$
		50,0 ml	0,5 — 50,0	$\pm 0,5$
		100,0 ml	1,0 — 100,0	$\pm 1,0$
		500,0 ml	5,0 — 500,0	$\pm 5,0$
11	Volume, in ml	Measuring glass 500,0 ml	10,0 — 500,0	$\pm 12,5$
12	Relative humidity, in %; temperature, in °C	Psychometric hydrometer VIT-1	20 — 90 0 — 25	$\pm 2,0$

Table 7.1-3

SSS data used by the recognized testing laboratories

Nos.	Name of SSS	SSS designation (SI system graduation, measuring accuracy check)	Certified characteristic	Range of values	Certified value accuracy
1	Standard samples of sulphur mass fraction in oil and oil products	Verification of X-ray fluorescence spectrometer for the analysis of sulphur in oil, calibration, measuring check	Mass concentration of sulphur, in % by mass	Mass concentration of sulphur, in % by mass 0,054 — 0,066 0,450 — 0,550 0,900 — 1,100 2,250 — 2,750 4,500 — 5,500	Relative accuracy, in % 3,0 2,5 2,5 2,5 1,5
2	Standard samples of closed cup flash point	Temperature measurement accuracy check	Flash point, in °C	Flash point, in °C 77 — 87 165 — 200	Absolute accuracy, in % 1,0 2,0
3	Standard samples of viscosity	Viscosity measurement accuracy check	Kinematic viscosity, in mm ² /s, in cSt	Kinematic viscosity, in mm ² /s, in cSt 85 — 116 255 — 345 15 — 21 4 — 6	Relative accuracy, in % 0,2 0,2 0,2 0,2
4	Standard samples of liquid density	Density measurement accuracy check	Density at 20 °C, in kg/m ³	Density at 20 °C, in kg/m ³ 865,0 — 870,0 877,0 — 885,0 898,0 — 908,0 997,0 — 1001,0	Absolute accuracy, in % 0,05 0,05 0,05 0,05
5	Standard samples for determination of water content	Water content measurement accuracy check	Water content, in % by mass	Water content, in % by mass 0,450 — 0,550 1,35 — 1,65	Relative accuracy, in % 2,0 2,0
6	Standard samples of mechanical admixtures in oil	Mechanical admixtures measurement accuracy check	Mechanical admixtures content, in % by mass	Mechanical admixtures content, in % by mass 0,045 — 0,055 0,200 — 0,300	Relative accuracy, in % 5,0 5,0
7	Standard samples of oil products (hydrocarbons) in carbon tetrachloride	Measuring accuracy check of oil product content in bilge (ballast) water	Oil product content, in mg/l	Oil product content, in mg/l 50,0	Relevant accuracy, in % 5,0
8	Standard samples for monitoring TBN determination	Base (alkali) concentration measurement accuracy check	Base concentration, in mg KOH/g	Base concentration, in mg KOH/g 3,70 6,30	Relevant accuracy, in % 2,0 2,0

Table 7.1-3 — continued

Nos.	Name of SSS	SSS designation (SI system graduation, measuring accuracy check)	Certified characteristic	Range of values	Certified value accuracy
9	Standard samples for determination of pour point	Pour point measurement accuracy check	Pour point, in °C	Pour point, in °C –28 to –31	Absolute accuracy, in % 3,0
10	Standard samples for determination of crystallization point	Crystallization point measurement accuracy check	Crystallization point, in °C	Crystallization point, in °C –54,3	Absolute accuracy, in % 3,0
Note. SSS developed by the State Research Center of the Russian Federation "D.I. Mendeleev All-Russian Institute for Metrology" and manufactured by Ekros, CJSC, St. Petersburg, may be used as state standard samples.					

The list is based on the well-tested and widely applied facilities for testing laboratories rendering services to sea transport on oil product and oily water analyses. Provision of testing laboratories with the above types of equipment is recommendatory.

To be recognized by the Register the testing laboratories may be provided with other similar equipment, unless it is technically inferior to that listed in Tables 7.1-1, 7.1-2, 7.1-3.

8 EXPRESS ANALYSIS OF OIL PRODUCTS

8.1 Bunker fuel oil express analysis.

Bunker fuel oil express analysis is performed onboard the ship or fueller vessel, or in the oil oil delivery terminal laboratory.

Domestic portable testing laboratories (PLAM express laboratories), as well as similar devices kits for express analyses of foreign firms, e.g. PSK MARTEC, GmbH, Germany are used for the analysis.

The following parameters (characteristics) are determined:

density: density from 0,8 to 1,05 kg/cm³; viscosity: kinematic viscosity at the temperatures of 40 and 50 °C;

water content: water presence within 2 %; stability/compatibility: compatibility and stability according to ASTM D 4740-04(2009).

8.2 Express analysis of lubricating oils.

The express analysis of oil from the lubrication systems of marine diesel engines, turbines, air compressors, controllable pitch propellers (CPP) and other machinery is performed onboard the ship for determination of lubricating oil condition and assessment of technical conditions of ship facilities.

Basic parameters (characteristics) determined during the lubricating oil express analysis:

watering of lubricating oil;

carbon concentration and oxidation lubricating oil oxidation;

change in viscosity (e.g. by fuel dilution);

change in motor oil's total base number (TBN);

change in base acid number (BAN) of turbine, hydraulic and other industrial oils.

For lubricating oil express analysis use is made of domestic PLAM-1, PLAM-3 and SKLAMT express laboratories, imported express laboratories, as well as special devices kits for express analyses.

8.3 Express monitoring of ship equipment wear.

The express monitoring is performed using FCHM-P Ferro-indicator, which makes it possible to determine on board high ferrum concentration in the lubricating machine oil that predicts the increase in wear rate of friction components (pistons, piston rings or diesel engine cylinder liners), or by means of any other apparatus having similar characteristics.

8.4 Equipment for express analyses.

Portable laboratories used shall be provided with a required reagents kit to perform oil analysis.

For calibration of equipment express analyses the SSS may be used.

The express analysis data shall not be used for presentation of claims or issuing oil product quality passport. Where the express analysis showed that the oil product is substandard, these data shall be verified by laboratory tests in the testing laboratory recognized by the Register.

**9 RECOGNITION OF TESTING LABORATORIES PERFORMING OILY WATER ANALYSIS
(CODE 21002200) AND FUEL AND OIL ANALYSIS (CODE 21002300)**

9.1 Recognition of testing laboratories is carried out to establish and confirm their competence and readiness to perform oily water, fuel oil and oil analyses in compliance with the requirements of:

MARPOL 73/78, recommendations of relevant IMO resolutions and other international and national documents relating to environment pollution prevention;

IACS, RS and industry standards on assessment of the technical condition of ship items to be surveyed with respect to the necessity of submitting analyses results of bunker oils, lubricating oils and oils currently in use in onboard machinery.

Recognition of testing laboratories by the Register is carried out in compliance with the requirements of Section 9, Part I "General Regulations for Technical Supervision" of the Rules for Technical Supervision during Construction of Ships and Manufacture of Materials and Products for Ships.

The inspections are carried out directly in the testing laboratories in terms agreed with the applicant according to the following programme:

.1 organizational support and management system: adequacy of actual testing laboratory organizational chart;

availability and efficiency of testing quality control system;

.2 facilities and normative and technical documentation:

arrangement of personnel, measuring and testing equipment;

condition of laboratory spaces;

availability and metrological condition of measuring and testing equipment;

normative documentation support, its updating and maintenance condition;

.3 competence and readiness to perform analyses:

personnel qualification and experience within the area of recognition;

performance of check tests.

46. GUIDELINES FOR SAFETY OF TOWED SHIPS AND OTHER FLOATING OBJECTS, INCLUDING RIGS, FACILITIES AND PLATFORMS IN THE SEA (INTRODUCED BY IMO RESOLUTION A.765(18), ADOPTED ON 04.11.1993)

1 PLANNING

1.1 The route to be followed should be planned in advance, taking into account such factors as the anticipated weather, tidal streams and currents, the size, shape, windage and displacement of the tow and any navigational hazards to be avoided. Weather routing advice should be used where available. Careful consideration is to be given to the number, size and effective bollard pull of the towing ship or ships to be employed.

1.2 There should be a contingency plan to cover the onset of adverse weather, particularly in respect to arrangements for heaving to or taking shelter.

1.3 Where the towing operation falls under the jurisdiction of an approving authority, any certificate issued should specify the intended general route and indicate any special conditions, also noting the responsibility and authority of the master/person in command of tug and tow to deviate from the proposed route should circumstances warrant this measure.

2 PREPARATION

2.1 Tows should exhibit the navigation lights, shapes and, if manned, make the sound signals required by the International Regulations for Preventing Collisions at Sea, 1972, as amended. Due consideration should be given to the reliability of the lights and sound signals and their ability to function for the duration of the voyage. When practicable, a duplicate system of lights should be provided.

2.2 Prior to sailing, the watertight integrity of the tow should be confirmed by an inspection of the closing arrangements for all hatches, valves, airpipes, and other openings through which water might enter the towed unit and affect its stability. It should also be confirmed that any watertight doors or other closing arrangements within the hull are securely closed and that any portable closing plates are in place.

2.3 The securing arrangements and weather protection for the cargo, equipment and stores carried on the tow should be carefully examined to ensure that they are adequate for the voyage.

2.4 When appropriate, the rudder should be secured in the amidships position and measures taken to prevent the propeller shaft from turning.

2.5 The tow should be at a suitable draught and suitably trimmed for the intended voyage.

2.6 The tow should have adequate intact stability in all the loaded and ballast conditions expected during the voyage

2.7 The tow should be equipped with an anchor, suitable for holding the tow in severe weather conditions, that is securely attached to a chain cable or wire and is arranged for release in an emergency either by persons on the tow or boarding the tow for this purpose, unless rendered impractical due to the design or condition of the towed unit.

2.8 Life-saving appliances in the form of lifejackets and lifebuoys should be provided whenever personnel are likely to be on board the tow even if only for short periods. When personnel are expected to remain on board for longer periods of time, liferafts should also be provided. Whenever the tow is continually manned, the riding-crew should be provided with adequate supplies of food and water, cooking and sanitary facilities, radio equipment, including means of communication with the towing ship, distress signals, life-saving and fire-fighting appliances.

2.9 Boarding facilities should be rigged on each side of the tow so that personnel from the towing ship can board at any time.

2.10 Every towed unit, whether manned or not, should be provided with a certificate confirming its fitness to be towed.

2.11 To reduce the risk of pollution, the amount of oil carried on the tow should be limited to what is required for the safety of the tow and/or towing ship and for their normal operations, provided no risk to the environment will result from the removal of oil from the towed unit.

3 TOWING ARRANGEMENTS

3.1 The towing arrangements and procedures should be such as to reduce to a minimum any danger to personnel during the towing operation.

3.2 The towing arrangements should be suitable for the particular tow and of adequate strength

3.3 The design and arrangement of towing fittings should take into account both normal and emergency conditions.

3.4 Sufficient spare equipment to completely re-make the towing arrangements should be available, unless impractical.

3.5 Secondary or emergency towing arrangements should be fitted on board the tow so as to be readily recoverable by the towing ship in the event of a failure of the main towing system or ancillary equipment.

4 THE TOW

4.1 The towing operation should be in the charge of a competent towing master. Other towing personnel should be suitably experienced and sufficient in number.

4.2 The tow should not proceed to sea until a satisfactory inspection of the towing ship as well as the towage, closing and stowage arrangements of the tow has been carried out by the towing/tug master and, when considered to be necessary, by another competent person.

4.3 In special cases, where particular circumstances or factors signify an increased risk to the tow, or where the risk cannot be evaluated on the basis of seafaring and nautical knowledge and experience alone, the owner or towing/tug master should apply for survey in accordance with the guidelines of a competent organization or authority as appropriate.

4.4 In the special cases referred to in 4.3 coastal State authorities should be informed in advance of a tow and, after departure, coast radio stations or coastguard should be kept informed of the progress.

5 TOWAGE AND OPERATING MANUALS

5.1 For the towage of ships and other floating objects, including installations, structures and platforms, special towage requirements, of which due account should be taken, should be laid down in the towage and/or operating manuals of such units (as appropriate), copies of which should be given to the towing master and tug master(s).

6 IN AN EMERGENCY

6.1 Should the tow present a direct danger to navigation, offshore structures or coastlines through breaking adrift or for some other cause, the master of the towing ship is bound by SOLAS V/2 to communicate the information by all the means at his disposal to ships in the vicinity, and also to the competent authorities at the first point on the coast with which he can communicate.

In all cases, the arrangements for recovering the tow, should it break adrift, are to be made in accordance with good seamanship, bearing in mind the seasonal weather conditions and area of operation.

47. RECOMMENDATIONS TO ENSURE SEAWORTHINESS PROPERTIES AND POSING OF RESTRICTIONS DUE TO WEATHER CONDITIONS DURING PASSAGES

1. Where higher freeboard, enhanced stability or strength of the ship are required by the Rules for the area of passage, the Shipowner shall make all reasonable and practicable arrangements to meet the Rules requirements by choosing favourable ballasting or loading of the ship, hull reinforcement or dismantling of structures and equipment that can be considered not necessary for the passage.

2. Where substantial structural alterations that are hard to make are required to satisfy fully the requirements of the Rules, prescribed weather restrictions may be applied.

The prescribed weather restrictions shall be substantiated by calculations of wave and wind loads which meet the Rules' requirements as regards strength, stability and freeboard, the experience gained in passages of sister and similar ships within this area being taken into account.

Recommended methods of evaluating limit sea states based on ship strength and limit wind force based on stability are given in Annexes 5 and 6

3. Weather restrictions for the passage shall be not less stringent than the restrictions set for the prescribed area of navigation provided the possibility of applying other, less stringent restrictions, is not confirmed by calculations of the strength, stability and freeboard of the ship, performed for the relevant area of the passage.

4. When setting weather restrictions, apart from regulated sea-keeping qualities such as strength, stability, buoyancy and unsinkability (freeboard), account shall be taken of the extent to which the general seaworthiness is ensured, i.e. governed by the ship size, relationship of principal dimensions, hull lines, height of ship ends above the waterline, availability of superstructures, types of closing arrangements, adequate speed.

5. If in case of set weather restrictions, the general seaworthiness of the ship, its stability and draughts cannot provide adequate prevention of excessive accelerations due to ship motions and/or dangerous impacts of the hull against water (slamming) when moving in a seaway, in addition to the weather restrictions, elaboration and issuance to the ship of mandatory recommendations on choosing the course and speed in a seaway shall be required. For ships limited by wind force 8 (fresh gale) and more and by sea state 7 (rather rough sea) and more, no weather restrictions are normally set.

6. In no case shall the limit wave height applied in setting weather restrictions exceed twice the bow freeboard height.

In order to ensure the general (navigational) seaworthiness, the ship shall have an adequate draught on even keel or have a moderate trim by the stern and full submergence of the propeller (for passage under ship's own propulsion). In general case, the draught amidships equal to $L/40 + 1,0$ with a trim by the stern not more than $0,015L$, where L is the length of the ship, in m, is considered to be normal. In no case shall the limit wave height applied in setting weather restrictions exceed twice the draught amidships.

7. When setting weather restrictions for a passage of a ship of inland navigation, use shall be made of the specified conditions that shall be met by such ship proceeding to sea.

The conditions are summarised in Table 7.

Geographic areas shall be considered and agreed upon with the Register in each case.

Ships in class «JI» PPP are not allowed for sea passage without the hull reinforcement.

8. The lesser the ship, the more severe are weather restrictions.

Based on the ship size, the wave height with 3 per cent probability of exceeding level used in setting weather restrictions shall not exceed $h_{3\%} = 0,25L^{3/4}$, where L is the length of the ship, in m. For ships of more than 70 m in length weather restrictions based on the ship size are not set. For ships of less than 70 m in length weather restrictions shall not be less severe than those prescribed for the particular area of navigation in compliance with the requirements of the Rules for Construction.

Table 7

Class of the Russian River Register	Permitted wave height with 3 per cent probability, m		Corresponding sea state, numbers (range of wave heights, m, is given in brackets)
	As specified by PPP Rules	At passage by sea	
class M-CII	3,5	$\leq 3,5$	5 (2 — 3,5)
M-IIP	2,5	$\leq 2,5$	5 (2 — 3,5)
O-IIP	2,0	$\leq 2,0$	4 (1,25 — 2,0)
O	$1,75(h_{1\%}=2,0)$	$\leq 1,7$	4 (1,25 — 2,0)
P	$1,05(h_{1\%}=1,2)$	$\leq 1,0$	3 (0,75 — 1,25)

9. In addition to the limitations on strength and stability conditions or on the freeboard and irrespective of them, for ships with unseaworthy and poorly seaworthy hull shape, characterised by unusual relationship of dimensions, non-streamlined hull, the lack of superstructures (especially a forecastle), the insufficient elevation of the fore end (for example, for pontoon-type ships), weather restrictions attributed to the unseaworthy hull shape shall be set.

These restrictions are motivated by the experience gained in passages of sister or similar ships and, as a rule, do not exceed 5 by sea state (unless the more stringent restriction is required for other reasons).

When imposing the strength restrictions on a floating dock, the requirements of 3.12.4.8, Part "Hull" of the Rules for Construction shall be met.

In all cases, the most severe restriction is imposed when restrictions based on several reasons (for example, strength and stability) are set.

10. Weather restrictions are set by specifying the common data on wind and wave conditions, adopted in the Hydrometeorological Service, which are limiting for the particular ship.

Wind restrictions are specified in Beaufort numbers relating to the mean equivalent wind speeds in the wind speed range which includes the ultimate wind speed established.

Sea state restrictions are specified in numbers of the sea state scale in force relating to wave heights with 3 per cent probability of exceeding level in the wave height range which includes the ultimate wave height established.

Specifying the weather (in numbers) and sea state (by the established wave height with 3 per cent probability of exceeding level) restriction, it is necessary to proceed from the following provision: where the ultimate wave height with 3 per cent probability of exceeding level for the given ship and the wave range for a particular sea state number is equal to or less than the mean wave height value of the range (the arithmetic mean of boundary values), the sea state restriction is specified one number less.

The same approach shall be followed when the weather restriction in wind force numbers is specified.

11. The observance of weather restrictions depends, in particular, on the receipt of forecasts correspondingly to data on wind and wave restrictions specified. The adoption of sea state ranges in wave heights with 3 per cent probability of exceeding level requires forecasts on the same wave heights. Thus, it shall be taken into consideration that if in the forecast the especially predictable wave height with 3 per cent probability of exceeding level is not given, the wave height with 5 per cent probability of exceeding level is specified in national forecasts for the seas washing the Russian Federation and with 13,5 per cent probability of exceeding level - for other seas and in all foreign forecasts. Connection between these heights is determined by the following formulae:

$$h_{3\%} = 1,08h_{5\%};$$

$$h_{3\%} = 1,33h_{13,5\%};$$

The adoption of wind number intervals in mean equivalent speeds for calculations by these formulae does not require the consideration of gusts in forecasts.

In addition to the provision of the passage area with weather forecasts and gale warnings, the timely transmission of forecasts and warnings to the ship shall be ensured and for this purpose the ship shall be provided with a radio station to receive forecasts and warnings through suitable organisation of the listening watch.

If there are weather restrictions, the ship shall be provided with a wind gauge and aneroid barometer.

12. Ballasting of ships for a passage or loading of ships lacking the sufficient ballast capacity, shall provide for the most favourable condition to ensure strength, stability and buoyancy (freeboard). In the same time, ballasting combined with loading shall ensure the sufficient draught to avoid excessive wave impacts against the bottom at the fore end and the necessary submergence of the screw (in passage under the ship's own steam).

13. Conditions of passage are established in the passage plan (refer to 8.5 of Part II "Carrying out Classification Surveys of Ships" of the Guidelines).

14. Ship's passage in ice conditions shall be considered by the Register in each particular case, taking into account the ice reinforcements of the hull.

48. SC 249. IMPLEMENTATION OF SOLAS REGULATION II-1/3-5 AND MSC.1/CIRC.1379

SOLAS Regulation II-1/3-5

From 1 January 2011, for all ships, new installation of materials which contain asbestos is prohibited.

MSC.1/Circ.1379

In the context of this regulation, new installation of materials containing asbestos means any new physical installation on board. Any material purchased prior to 1 January 2011 being kept in the ship's store or in the shipyard for a ship under construction, should not be permitted to be installed after 1 January 2011 as a working part.

Unified Interpretations SOLAS Regulation II-1/3-5

1. Verification that "new installation of materials which contain asbestos" under SOLAS II-1/3-5 is not made on ships requires the Recognized Organization to review asbestos-free declarations and supporting documentation, for the structure, machinery, electrical installations and equipment covered by the SOLAS Convention, which shall be provided to the Recognized Organization by shipyards, repair yards, and equipment manufacturers for:

new construction (keel laid, or at a similar stage of construction, on or after 1 July 2012);

conversions (contract date for the conversion or, in the absence of a contract, the date on which the work identifiable with the specific conversion begins) on or after 1 July 2012;

IMO Circular MSC.1/Circ.1379

2. The phrase "new installation of materials containing asbestos" in IMO Circular MSC.1/Circ.1379: means that material used (i.e., repaired, replaced, maintained or added) as a working part of the ship as per Annex 1 which is installed on or after 1 July 2012 is required to be documented with an asbestos-free declaration. The Recognized Organization will, in consultation with the Company's nominated person responsible to control asbestos-containing material onboard as per the Safety Management System in compliance with IMO Circular MSC/Circ.1045, audit this documentation during annual safety construction and safety equipment surveys; and

does not preclude the stowage of material which contains asbestos onboard (e.g., spare parts existing on board as of 1 July 2012).

3. The phrase "should not be permitted to be installed after 1 January 2011 as a working part" in IMO Circular MSC.1/Circ.1379 means that replacement, maintenance or addition of materials used for the structure, machinery, electrical installations and equipment covered by the SOLAS Convention which contain asbestos is prohibited.

4. During periodical surveys of ships in service the surveyor to the Register shall verify that the asbestos-free declarations are submitted and filled in accordance with the recommended form "Declaration of Conformity: Asbestos Free Construction in accordance with SOLAS Regulation II-1/3-5" located in www.rs-class.org in the section "Services/Technical supervision during construction of ships and floating facilities" (<http://www.rs-class.org/en/register/services/csupervision/>) — refer to IACS Recommendation No. 130.

Annex 1

Structure and/or equipment	Component
Propeller shafting	Packing with low pressure hydraulic piping flange Packing with casing Clutch Brake lining Synthetic stern tubes
Diesel engine	Packing with piping flange Lagging material for fuel pipe Lagging material for exhaust pipe Lagging material turbocharger

Continued

Structure and/or equipment	Component
Turbine engine	Lagging material for casing Packing with flange of piping and valve for steam line, exhaust line and drain line Lagging material for piping and valve of steam line, exhaust line and drain line
Boiler	Insulation in combustion chamber Packing for casing door Lagging material for exhaust pipe Gasket for manhole Gasket for hand hole Gas shield packing for soot blower and other hole Packing with flange of piping and valve for steam line, exhaust line, fuel line and drain line
Exhaust gas economizer	Lagging material for piping and valve of steam line, exhaust line, fuel line and drain line Packing for casing door Packing with manhole Packing with hand hole Gas shield packing for soot blower Packing with flange of piping and valve for steamline, exhaust line, fuel line and drain line Lagging material for piping and valve of steam line, exhaust line, fuel line and drain line
Incinerator	Packing for casing door Packing with manhole Packing with hand hole Lagging material for exhaust pipe
Auxiliary machinery (pump, compressor, oil purifier, crane)	Packing for casing door and valve Gland packing Brake lining
Heat exchanger	Packing with casing Gland packing for valve Lagging material and insulation
Valve	Gland packing with valve, sheet packing with piping flange Gasket with flange of high pressure and/or high temperature
Pipe, duct	Lagging material and insulation
Tank (fuel tank, hot water, tank, condenser), other equipments (fuel strainer, lubricant oil strainer)	Lagging material and insulation
Electric equipment	Insulation material
Ceiling, floor and wall in accommodation area	Ceiling, floor, wall
Fire door	Packing, construction and insulation of the fire door
Inert gas system	Packing for casing, etc.
Air-conditioning system	Sheet packing, lagging material for piping and flexible joint
Miscellaneous	Ropes Thermal insulating materials Fire shields/fire proofing Space/duct insulation Electrical cable materials Brake linings Floor tiles/deck underlay Steam/water/vent flange gaskets Adhesives/mastics/fillers Sound damping Moulded plastic products Sealing putty Shaft/valve packing Electrical bulkhead penetration packing Circuit breaker arc chutes Pipe hanger inserts Weld shop protectors/burn covers Fire-fighting blankets/clothing/equipment Concrete ballast

Note. The list mentioned above is in compliance with para 2.2.2.1.2 of Annex 5, IMO resolution MEPC.197(62).

49. IACS RECOMMENDATION NO. 122

INTEGRAL BUOYANCY CASINGS IN LIFEBOATS AND RESCUE BOATS

1. Cases have been discovered where water ingress into the Integrated (Built-in) Buoyancy Casings of Rescue Boats and Lifeboats has caused damage to the internal buoyancy foam material. Where such foam is of the open cell two-part expanding polyurethane type the ingress can lead to significant damage to the foam, which may absorb the water and take on sponge-like characteristics. In these cases the laden weight of the boat may be significantly affected and may cause an overload on the boat or launching appliance.

2. Where the foam is known to be of the open cell type, or doubt exists as to the type of foam incorporated in the boat's buoyancy casings, it is recommended that the following precautions be taken by the safety officer or Service Company at the time of each boat inspection.

2.1 The boat's hull in way of all buoyancy casings should be thoroughly examined for cracks, holes, buckling or folding of the structure and general deterioration. Particular attention should be paid in way of the hull to deck connection and the buoyancy casing to hull connections.

2.2 Any foam injection points (subsequently closed) should be examined for cracking or deterioration.

2.3 The external hull and any fendering points in way of integrated buoyancy casings should be examined for holing, cracking and deterioration.

2.4 Any penetrations to the buoyancy chambers, for example, where seat belts, thwarts or grab lines are attached, should be closely examined for fit, gasketting (where fitted) and tightness. Loose fittings should be adjusted and the affected buoyancy chamber examined with special care regarding water penetration.

2.5 The drain plugs should be removed from the boat at the time of the inspection and the quantity of water drained should be monitored to ensure it is not excessive.

2.6 Boat performance whilst maneuvering should be monitored for unusual performance, heaviness or excessive sluggishness which might be attributable to an increased boat weight.

3. Should any doubt exist as to the integrity of the integral buoyancy, and water ingress is suspected, the boat should be weighed to confirm that boat weight remains unchanged.

50. GUIDANCE ON TECHNICAL SUPERVISION OF ANCHORING EQUIPMENT IN SERVICE (WITH DUE ACCOUNT FOR THE PROVISIONS OF IACS RECOMMENDATION NO. 79)

1 GENERAL

This Annex contains information on fault detection methods for anchors, anchor cables and anchor ropes, their parameters to be gauged as well as criteria for assessing their technical condition in service.

2 ANCHOR CABLE FITTINGS

Joining shackles, D-shackles, links and other cable fittings shall be gauged at their point of the greatest wear down and shall be replaced where the wear down equates to 12 per cent loss and more of diameter over original (refer to Figs. 3, 4 and 5).

In the case of swivel eyelet axle wear down, consideration shall also be given to replacement where the maximum lateral movement equates to 5 per cent loss or more of the eyelet axle diameter (refer to Fig. 5).

In the case of swivel eyelet axle wear down, consideration shall also be given to replacement where the maximum lateral movement equates to 5 per cent loss or more of the eyelet axle diameter (refer to Fig. 5).

3 ANCHOR SURVEY

Where fluke angle is modified by more than 50 per cent of nominal value with regard to anchor pin, wear of shanks, pins and shank openings by 10 per cent or more occurs and cracks appear in above components, the anchor shall be replaced. In the case of appreciable anchor shank looseness with regard to flukes, the Register may give consideration to repair using sleeves for instance.

Where the anchor mass reduces by 20 per cent or more due to corrosive wear, it shall be replaced.

4 ROPES

A steel rope shall be replaced where ruptured wires make up 1/10 or more of the total wires on any rope length equal to eight diameters, or where the loss of wire diameter is 40 per cent and more over original as a result of surface wear or corrosion and in case of excessive rope deformation.

5 SURVEY OF STUDS IN ANCHOR CHAIN CABLE

Links with studs missing or loose are not permitted for further use and shall be replaced except where the stud movement does not exceed the following values between occasional surveys (refer to Fig. 6):

maximum axial stud movement is 3 per cent of cable diameter;

maximum lateral stud movement is 5 per cent of cable diameter;

maximum gap between link and stud is 3 mm.

Loose studs in anchor chain cables may be repaired by electric welding around the circumference (on one end of the stud) to owner's satisfaction provided measures are taken as described below.

6 THE SECURING BY WELDING OF CHAIN CABLE STUDS IN SERVICE.

Where it is proposed to secure loose anchor cable studs by welding, the repair documentation shall be submitted to the Surveyor for evaluation and approval. The approval shall be based on the condition of the link to be repaired and of remaining links (if the link wear down approaches 12 per cent, preference shall be given to replacement instead of repair to damaged links).

Any such repairs shall be carried out in a clean environment as far as practicable. The attachment of earthing straps to cable links shall be specially considered prior to welding.

7 ANCHOR CABLE REPAIR BY WELDING

Welds shall be made in compliance with an approved welding procedure and accepted by the Surveyor. Welding consumables used shall be approved with grading 3 or 3Y. For Grades 1 and 2 chain cables, consumables shall have low hydrogen grading H15 or better and for Grade 3 chain cables, a very low hydrogen grading of H5 or better.

A preheating temperature suitable to limit hardness and to prevent the risk of cold cracks shall be applied. In general, the following applies:

Grade 1 and 2: 100 °C;

Grade 3: 175 °C.

The welding practice and welding parameters shall be selected to permit a single weld deposit to be made. A temper bead at the stud side is allowed and may be advisable depending on the link grade.

After welding, links shall be wrapped to allow a slow cooling.

8 WELDING PROCEDURE APPROVAL TESTS

The approval test procedure shall be representative of the actual welding conditions. The scope of testing of the test sample shall include macrosection test specimens and hardness measurements. The hardness of the weld metal and of the heat-affected zone shall not exceed:

380 HV10 for Grade 1 and Grade 2 chain cables, and for Grade 3 chain cables in the normalized and normalized and tempered conditions;

420 HV10 for Grade 3 chain cables in the quenched and tempered condition.

9 REPAIR PROCEDURE.

The abutting surfaces of the link and stud to be welded shall be ground to produce a good fit with an acceptable root gap to prevent cracking. The surfaces shall be free from moisture, grease, rust, etc., just prior to welding. The studs shall be welded by a Register-approved procedure. Magnetic particle examination to check that the link is free from cracks shall be performed before welding at Surveyor satisfaction. Welding shall be performed by qualified welders.

Welding consumables shall be dried adequately prior to welding in accordance with manufacturer's recommendation. The stud shall be welded at the end opposite to the flash butt weld of the link and it shall be welded completely around the circumference. All weld stop-starts shall be grounded to remove any defects and to blend smoothly with the base material.

10 EXAMINATION

All welds shall be subjected to visual and magnetic or liquid particle examination.

In the case of Grade 3 chain cables, inspection shall be recommended to be delayed for at least 48 hours after the weld has cooled to ambient temperature. Studs shall be located in the links in accordance with a 7.1.3.9.4 of Part XIII "Materials", Rules for the Classification and Construction of Sea-Going Ships.

11 ANCHOR GEAR FOUNDATIONS

Anchor gear foundation components shall be replaced with a wear of 20 per cent and more of the as-built thickness.

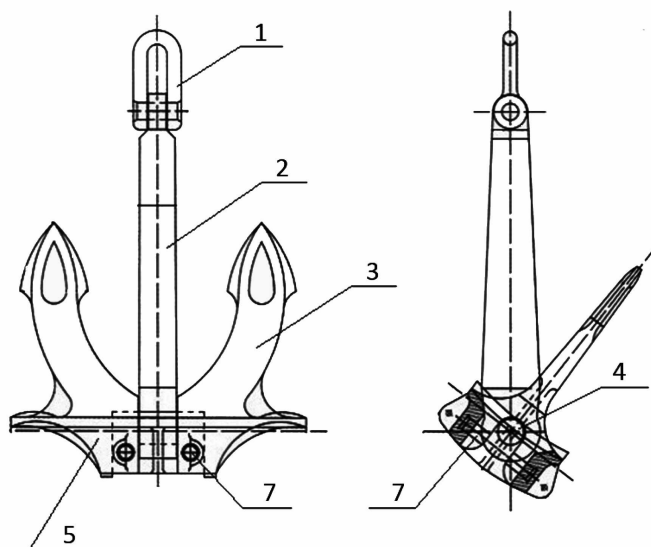


Fig. 1 Hall's anchor:

1 — anchor end shackle; 2 — shank; 3 — flukes; 4 — crown pin; 5 — crown plate; 6 — anchor chain with swivel; 7 — pin

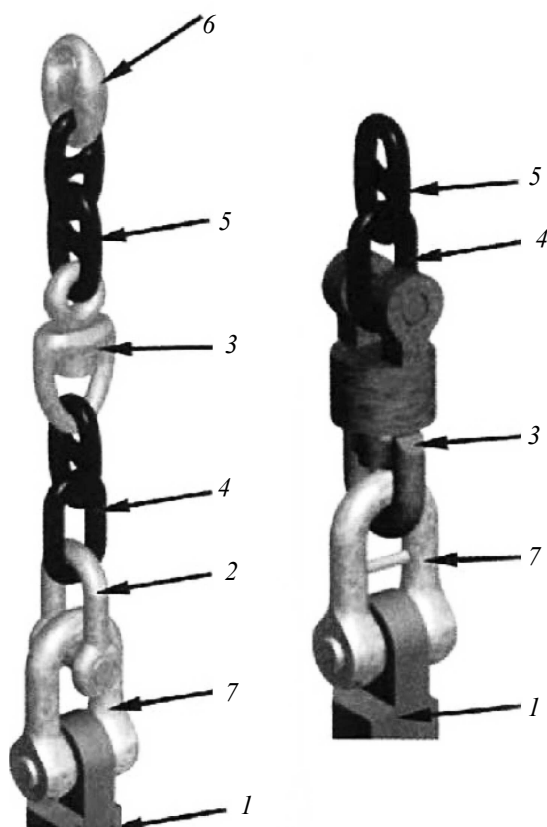


Fig. 2 Anchor chain length

1 — anchor shank; 2 — link shackle; 3 — swivel; 4 — open link;
5 — enlarged link; 6 — kenter shackle; 7 — anchor shackle
(crown shackle)

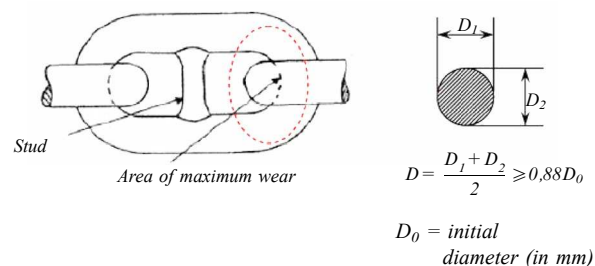


Fig. 3 Chain link gauging areas and permissible wear

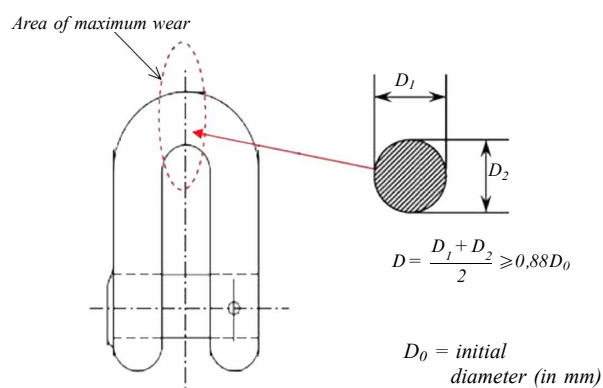


Fig. 4 Shackle gauging areas (link shackle, joining shackle) and permissible wear

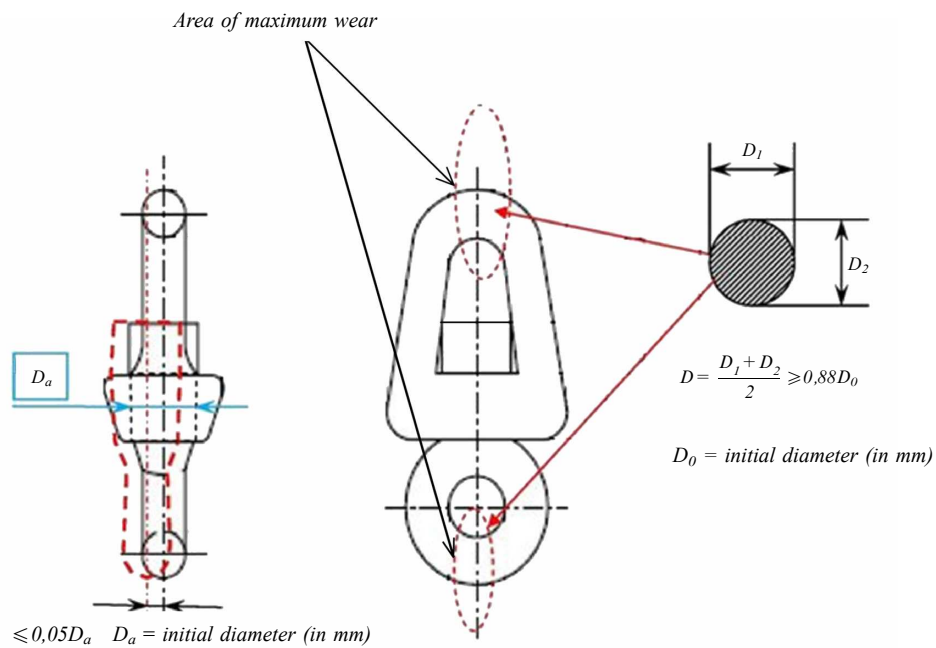


Fig. 5 Swivel gauging areas and permissible wear

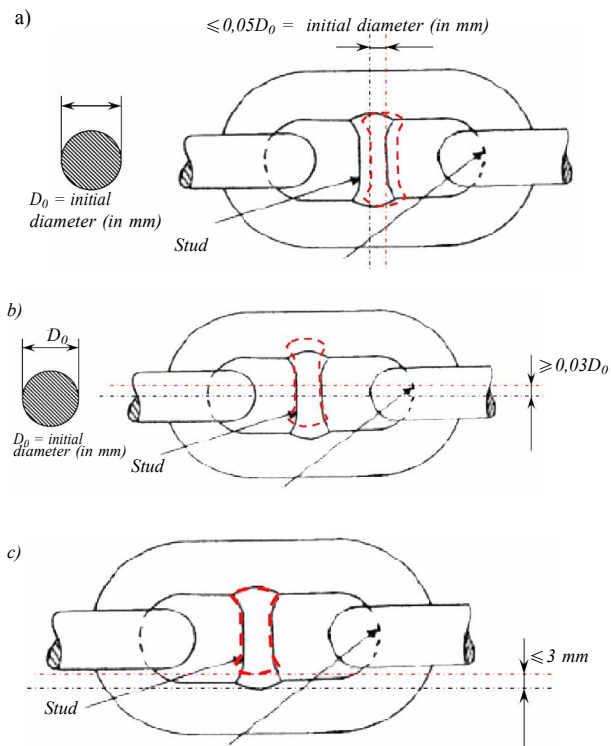


Fig. 6 Assessment criteria for loose anchor chain links:

- a — maximum permissible axial stud movement;
- b — maximum permissible lateral stud movement;
- c — maximum permissible gap between link and stud

51. GUIDELINES FOR PILOT PROGRAMS OF EXTENDED INTERVAL BETWEEN BOTTOM SURVEYS IN DRYDOCK

This Annex is based on IACS Recommendation No. 133 "Guidelines for Pilot Schemes of Extended Interval between Bottom Surveys in Dry-Dock".

1 APPLICATION

Provisions of present Guidelines shall be applied to all types of ships except for:

- passenger ships;
- oil tankers, bulk carriers, ore carriers, combination carriers and chemical tankers, which are surveyed according to Enhanced Survey Program (ESP);
- certain types of general dry cargo ships for which provisions of Section 7, Part III "Additional Surveys of Ships Depending on their Purpose and Hull Material" of the Rules are applied;
- ships fitted with steerable propellers;
- ships with cone key connection with propeller;
- High-Speed Craft (HSC).

2 GENERAL

The intervals between inspections of the outside of the ship's bottom are specified in SOLAS, IACS unified requirements and the Rules, according to which a minimum of two inspections shall be carried out during the 5 year validity period of the Safety Construction Certificate/Classification Certificate.

Regulation I/10(v) of SOLAS only requires a minimum of two surveys of the outside of the ship's bottom and does not specify a ship shall be drydocked out of the water.

The Survey guidelines for the harmonized system of survey and certification as amended, shall require that surveys of the outside of the ship's bottom shall normally be carried out with the ship in a dry-dock. However, it also shall provide that Administrations may give consideration to alternate inspections being carried out with the ship afloat. This Annex shall introduce a procedure for acceptance of pilot programs which extend the interval between surveys in dry-dock (hereinafter referred to as the Program). Ships eligible for the Program shall meet the provisions and conditions described in this Annex. Two consecutive in-water surveys are acceptable to be carried out for qualifying ships subject to the conditions described in this Annex. A minimum of two surveys of the outside of the ship's bottom shall be carried out during the five year period of validity of the Safety Construction Certificate/Classification Certificate and the intervals between any two surveys shall not exceed 36 months.

The Program which extends the interval between surveys of the outside of the ship's bottom in dry-dock shall be agreed with the shipowner, ship's Flag Administration and RS.

Possibility of acceptance into such Program shall be subject to the formal written agreement with the ship's Flag Administration including any additional specific Flag Administration requirements.

Entering into the Program of ships in service shall be allowed at any time until a ship reaches 10 years of age.

The period of the survey of the outside of the ship's bottom shall be calculated based on the date of entry of the ship into the Program. Necessary surveys of the outside of the ship's bottom afloat and in dry-dock shall be performed in accordance with the intervals calculated from the date of entry of the ship into the Program.

The Program shall be terminated in case of change of the owner, shipowner and / or the flag, in case the ship reaches 15 years of age. RS shall have the right to terminate the application of the Program for a particular ship at any time if non-compliance or violation of the established conditions by the Program are found. In this case, the ship shall return to the normal cycle of surveys of the outside of the ship's bottom.

The survey of the outside of the ship's bottom of the ship of 15 years of age shall be carried out in dry-dock during Renewal/ Special survey. All ships involved in the Program, shall be withdrawn from it, as soon as the ship reached 15 years old.

No extensions shall be granted for the dry-docking required at the end of each extended dry docking period. The Program which extends the interval between surveys of the outside of the ship's bottom in dry-dock shall be agreed with the shipowner, ship's Flag Administration and RS.

Possibility of acceptance into such Program shall be subject to the formal written agreement with the ship's Flag Administration including any additional specific Flag Administration requirements.

Entering into the Program of ships in service shall be allowed at any time until a ship reaches 10 years of age.

The period of the survey of the outside of the ship's bottom shall be calculated based on the date of entry of the ship into the Program. Necessary surveys of the outside of the ship's bottom afloat and in dry-dock shall be performed in accordance with the intervals calculated from the date of entry of the ship into the Program.

The Program shall be terminated in case of change of the owner, shipowner and/or the flag, in case the ship reaches 15 years of age. RS shall have the right to terminate the application of the Program for a particular ship at any time if non-compliance or violation of the established conditions by the Program are found. In this case, the ship shall return to the normal cycle of surveys of the outside of the ship's bottom.

The survey of the outside of the ship's bottom of the ship of 15 years of age shall be carried out in dry-dock during renewal/special survey. All ships involved in the Program, shall be withdrawn from it, as soon as the ship reached 15 years old.

No extensions shall be granted for the dry-docking required at the end of each extended dry docking period.

3 PROCEDURE FOR ENTERING THE SHIP INTO THE PILOT PROGRAM OF EXTENDED INTERVALS BETWEEN SURVEYS OF THE OUTSIDE OF THE SHIP'S BOTTOM IN DRY-DOCK

3.1 Written request by the shipowner for entering the ship into the Program shall be sent to RHO using the Written Request Template of Appendix 51-1.

3.2 The following documents shall be submitted with the written request:

a written agreement by the ship's Flag state MA for entering the ship into the Program.

RS may apply to the Flag state MA for getting its written agreement, provided the shipowner's notice in the request;

provisions for carrying out maintenance required on electric/electronic sensors e.g. echosounder, doppler-log, speedlog (propeller speedlog or backpressure speedlog), seawater temperature gauges, electronic draught reading, etc.;

provisions for maintaining the draft marks fore, aft and midships as well as load line marks (painted and welded figures) and all other required hull markings;

maintenance required of thrusters and stabilisers, if fitted, and provision for carrying out surveys or maintenance or as required by the surveyor;

service experience to-date with hull coating system covered by manufacturer's guarantee that the underwater coatings used are designed to last for the extended period since the coating is to remain effective for the extended dry docking period;

impressed cathodic protection system or provisions for renewal of external hull sacrificial anodes in the afloat condition, if applicable;

cathodic protection system specification and installation scheme, if applicable;

details on place and date where the ship is planned to be submitted to RS.

3.3 RHO is considered information submitted by the shipowner and documents in accordance with 3.1 and 3.2, analyzed information about ship in the ship's file on account of 1 and 2 as well as, ship's file records, if any, about inconsistencies found earlier with respect to underwater part within the period not exceeding 10 days. If needed, RHO may request additional information from shipowner and/or RS branch office of in-service supervision.

Upon satisfactory results of consideration RHO authorizes the RS Branch Office nearest to the planned port of call of the ship and shipowner and the RS Branch Office for in-service supervision in copy with regard to conditions of survey according paragraph 4 and 5, if it is time, on account of necessity to check additional mandatory conditions stipulated in 3.4.

The RS Branch Office fulfilled authorization shall forward the RS reports with the results of verification of condition 3.4, 4 and, if required, 5 to RHO within 2 working days after completion of surveys for the possibility of RHO to take decision with regard to further steps.

RHO is maintained record book of all ships with the RS class, for which the Program is applied as well as of ships, which were refused from application of the Program or Program became invalid. Record book shall contain at least the following information: ship's name, RS ID No, IMO number, type of the ship, class symbol, date of build, port of registry, ship's flag, ID number and date of RSHO confirmation letter of entering to the Program, ID number and date of RSHO confirmation letter about cancellation of validity of the Program, information about continuation of the Program referring on to RS document number.

Upon completion of the survey with satisfactory results and receiving confirmation from RSHO about possibility of the ship to enter the PROGRAM the following entry shall be introduced by RS surveyor in the section "Other characteristics" of Classification Certificate and in classification section of "Additional information for surveyor and shipowner" of the ship's survey status:

"The ship is entered to the Pilot Program of Extended Interval between bottom surveys in drydock (RS Report No. _____, date _____)."

3.4 Additional conditions for the final decision on entering the ship into the Program:

the ship is built according to Section 12 of Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships" of the Rules for the Construction having a distinguishing mark **IWS** in class notation.

Conditions of 2.5, Part II "Survey Schedule and Scope" of the Rules, Section 9, Part II "Carrying out Classification Surveys of Ships" of the Guidelines subject to the possibility of the in-water survey of the ship and obtaining information on technical condition of the in-water part of the ship which is normally obtained from a survey the ship's bottom in the dry-dock.

If the ship is not built according to Section 12 of Part XVII "Distinguishing Marks and Descriptive Notations in the Class Notation Specifying Structural and Operational Particulars of Ships" of the Rules for Construction and it does not have a distinguishing mark **IWS** in class notation, the ship shall have a distinguishing mark **TMS** in class notation or be implemented in the SCM system in accordance with Annex 13 "Regulations for implementation and maintenance of shafting condition monitoring system". Interval between normal surveys of main AMSS (if they are installed on board) shall not be less than 5 years in accordance with 2.10.8, Part II "Survey Schedule and Scope" of the Rules.

Protective coating in double bottom / double side ballast tanks, void spaces and all other spaces adjacent to the underwater shell plating shall be maintained in GOOD condition. Hull maintenance scheme shall be implemented by the shipowner in accordance with ISM.

3.5 Additional conditions of continuation of the Program on the ship.

For the possibility to continue implementation of the Program to the ship conditions previously prescribed and listed in 2 and 3.4 of this Annex shall be fulfilled. All subsequent surveys of underwater part of the ship afloat shall be carried out on account of paragraph 4 and, if applicable, 5. Appropriate entry in the ship's survey status and Classification Certificate remains valid. RS Branch Office for in-service supervision shall maintain additional record books of their ships which are entered into the Program and forward information about continuation of validity of the Program for each particular ship annually not later than 1-st working day of the last month of the current year.

If conditions of implementation of the Program to the ship are not adhered, the RS Branch Office which found such violation shall immediately notify RHO about it. Upon the results of analyze of submitted information RHO shall notify the shipowner, the RS Branch Office for in-service supervision, the RS Branch Office carried out survey and Flag State MA about invalidation of the Program. At that RHO may forward additional instructions on terms and scope of survey of the ship to the RS Branch Office for in-service supervision and/or the RS Branch Office performing survey of the ship.

4 PROVISION FOR IN-WATER SURVEY

An in-water survey shall be carried out in accordance with the requirements of 2.5 of Part II "Survey Schedule and Scope" of the Rules, Section 9 of Part II "Carrying out Classification Surveys of Ships" of the Guidelines and Annex 1 "Procedure for in-water survey of ships and other floating structures" of the Annexes to the Guidelines.

An in-water survey plan shall be submitted by the shipowner or the shipowner's representative to the RS Branch Office authorized to perform survey of the ship, at least, 5 days before the commencement of the survey, and shall include as minimum requirements of 9.1.10 and 9.1.11 of Part II "Carrying out Classification Survey of Ships" of the Guidelines and the following:

- scheduled time and place of submission for survey;
- name of recognized by RS diving company;
- Means for cleaning of the hull below waterline;
- provision for necessity of providing means of access for examination and thickness measurements of sea chests and ice boxes, means for examination of sea valves and box coolers;
- description of means of access, measuring devices etc.;
- provisions for determining the condition of anchoring equipment, necessity of ranging and measurements of anchor chain cables, examination of the chain lockers during survey;
- description of means of access, additional means for ranging of anchor chains etc., if necessary;
- provisions for surveying and maintaining of sea connections (overboard discharges) in underwater part of the ship;
- results of examinations by the shipowner's personnel of double bottom/double side ballast tanks (during the last 3 years) and other spaces adjacent to the shell with reference to structural deterioration in general, leakages in tank boundaries and piping and condition of the protective coating;
- conditions and means of access for internal examination of double bottom/double side ballast tanks (e. g., information regarding tank cleaning, gas freeing, ventilation, lighting, etc.).

Prior to commencement of the in-water survey, a survey planning meeting shall be held between the attending surveyor(s), the shipowner's representative in attendance, the diving company and the master of the ship or an appropriate representative appointed by the shipowner. To be discussed during the meeting are the organizational and technical requirements stipulated in the Survey plan, schedule for their performance, safety matters of the survey and efficiency of means to conduct the surveys.

A comprehensive report of findings, gaugings, clearances and any work undertaken, including recordings of representative CCTV images, shall be submitted by the shipowner to all involved parties.

If the in-water survey reveals damage, deterioration or other conditions that requires immediate elimination/repair, the RS surveyor shall require the ship to be dry-docked where necessary repairs can be carried out.

If temporary repairs are allowed by RS surveyor and carried out to any underwater parts the permanent repair of it shall be done within a due date assigned by the RS surveyor.

5 SPECIAL/RENEWAL SURVEY REQUIREMENTS

The periodicity of the ship's special/renewal surveys shall not change. Therefore, all such surveys and necessary repairs shall be done in assigned terms. If there is no possibility to carry out all necessary surveys and repairs afloat, the ship shall be dry-docked.

WRITTEN REQUEST TEMPLATE

for entering the ship into pilot program of extended intervals between surveys of the outside of the ship's bottom in dry-dock

The Applicant _____

in the person of, _____
(position, full name)

acting on the basis of

In compliance with applicable RS Rules and in agreement with the Maritime Administration of ship's flag*

Hereby request to consider attached information and confirm possibility of implementation of the Pilot program of extended intervals between surveys of the outside of the ship's bottom in dry-dock to the following ship:

Information of the ship:

General information:

Ship's name _____ RS № _____ IMO № _____

Port of registry _____ Flag _____

Ship's type _____ Date of build _____

Class symbol _____

Model of propeller (propeller, nozzle protected propeller, outboard pod propulsion unit, steerable propeller, vertical axis propeller, jet): _____

Information on propeller shaft and stern tube:

Model and material of propeller shaft _____

Propeller shaft liner (continuous/non-continuous) _____

Stern tube bearing lubrication system (oil/water) _____

Type of connection of the shaft with propeller (cone key, cone keyless, flange) _____

Information on entering of the ship into system of SCM (shaft control monitoring system)

The ship is entered into SCM system (yes/no) _____

The date of entering the SCM system _____

RS document, confirming entering the ship into SCM system _____

Information about date and place of submitting of the ships to RS:

Date: _____

The place of submitting of the ship to RS: _____

Agent details in port of submitting if any: _____

*written agreement is attached to this letter or if the applicant didn't request Maritime Administration, it is necessary to insert the following phrase: "Please apply to the ship's flag Maritime Administration for their written agreement subject to this matter").

List of documents attached to the written request (as appropriate):

1) written agreement by the ship's Flag Administration MA for entering the ship into the Program.
(This paragraph may be omitted. RS may apply to the Flag Administration MA for getting its written agreement by itself, if shipowner requested assistance of RS);

2) provisions for maintenance required on electric/electronic sensors e.g. Echo-sounder, Doppler-Log, Speedlog (propeller speedlog or backpressure speedlog), seawater temperature gauges, electronic draught reading, etc.;

3) provisions for maintaining the draft marks fore, aft and midships as well as Load line marks (painted and welded figures) and all other required hull markings;

4) maintenance required of thrusters and stabilizers, if fitted, and provision for carrying out surveys or maintenance or as required by the surveyor;

5) service experience to-date with hull coating system covered by manufacturer's guarantee that the underwater coatings used are designed to last for the extended period since the coating is to remain effective for the extended dry docking period;

6) impressed cathodic protection system or provisions for renewal of external hull sacrificial anodes in the afloat condition, if fitted;

7) cathodic protection system specification and installation scheme, if applicable;

8) copy of RS document, confirming entering the ship into SCM system.

The Applicant

_____/_____
(signature) (Full name)

Stamp

52. GUIDELINES ON SURVEY AND ASSESSMENT OF COATING CONDITION OF SHIP'S SPACES

1 GENERAL PROVISIONS

1.1 Application

These Guidelines are developed taking into account IACS Recommendation No. 87 and IMO circular MSC.1/Circ.1330 for survey and assessment of coating condition of ship's spaces.

Provisions of IACS Recommendation No. 87 and IMO circular MSC.1/Circ.1330 subject to maintenance and repair of coating, procedures for preparation of the surfaces before coating, procedure of the coating and so on and intended for shipowners, organizations, engaged in application of coating, maintenance and repair of coating are not included in these Guidelines.

This document shall be considered as the guidelines for assistance to the RS surveyors only to take correct decisions during survey of coating condition in ships spaces. In case of any doubts subject to interpretation or correctness of the use of these Guidelines, it is necessary to apply to RHO for additional instructions.

1.2 Provisions for survey of ship's spaces

Requirements for the scope of survey of ballast tanks and cargo spaces are described in the relevant Sections of the Rules.

Coating condition is determined as Good, Fair or Poor on the basis of visual inspection and estimated percentage of areas with coating failure and rusty surfaces (refer to Table 1.1).

Table 1.1

Definition of coating condition

	GOOD (3)	FAIR	POOR
Breakdown of coating or area rusted (1)	< 3 %	3 — 20 %	> 20 %
Area of hard rust scale(1)	—	< 10 %	≥ 10 %
Local breakdown of coating or rust on edges or weld lines (2)	< 20 %	20 – 50 %	> 50 %
Notes (1) % is the percentage of the area under consideration or of the "critical structural area". (2) % is the percentage of edges or weld lines in the area under consideration or of the "critical structural area". (3) spot rusting i.e. rusting in spot without visible failure of coating.			

2 COATING CONDITIONS

2.1 Definition

Definitions of coating conditions are given in the relevant Chapters of the Rules.

These Guidelines contain additional clarifications to the definitions stated in the Rules for unified assessment of coating conditions (also refer to Table 1.1):

GOOD: Condition with spot rusting on less than 3 per cent of the area under consideration without visible failure of the coating. Rusting at edges or welds, must be on less than 20 per cent of edges or weld lines in the area under consideration.

FAIR: Condition with breakdown of coating or rust penetration on less than 20 % of the area under consideration. Hard rust scale must be less than 10 % of the area under consideration. Rusting at edges or welds must be on less than 50 % of edges or weld lines in the area under consideration

POOR: Condition with breakdown of coating or rust penetration on more than 20 per cent or hard rust scale on more than 10 % of the area under consideration or local breakdown concentrated at edges or welds on more than 50 % of edges or weld lines in the area under consideration.

2.2 Areas under consideration

2.2.1 Areas under consideration, mentioned in the definitions of coating conditions, shall be deemed as areas with different coating conditions, on which the examined surface is divided for the assessment of coating condition in ship's space. Prescription and location of the surveyed space, disposition of the area on the length/height of the ship and the results of assessment is to be reported. The result of assessment of the coating condition of entire tank shall not exceed the results of assessment of its typical areas, having the lowest level of assessment.

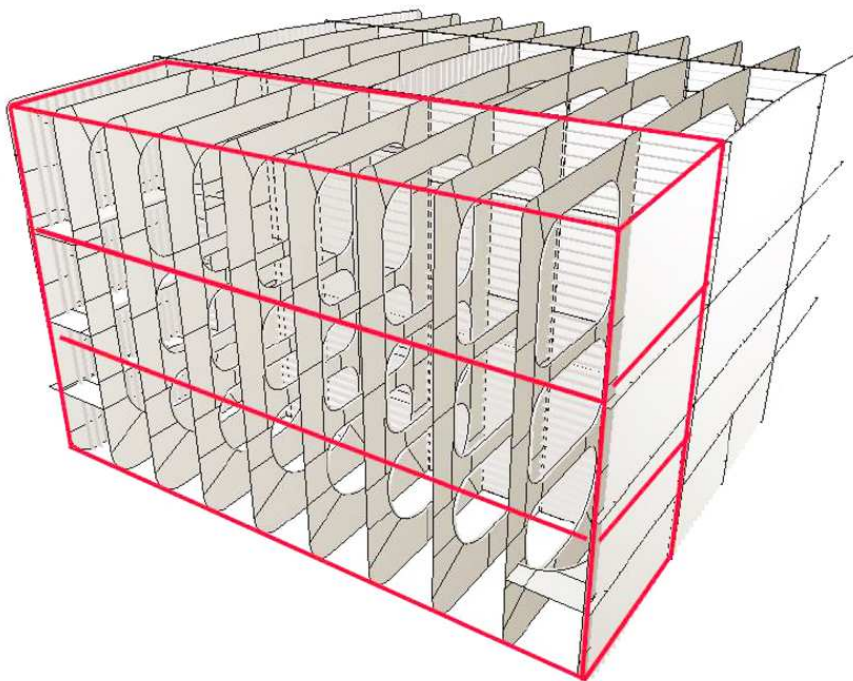
Special attention shall be given to coating in critical structural areas, definition of which is given in 1.1.1 of the Rules.

In such a case, each critical structural area is to be subject to assessment in accordance with Table 1.1. At that the result of assessment of areas under consideration shall be not less than the result of assessment of the critical structural areas, related to the area under consideration.

The "area under consideration" with the poorest coating condition will determine whether examination of ballast tanks is required at subsequent Annual Surveys.

Hence, it is not intended to "average" the coating condition for all "areas under consideration" within a tank, to determine an "average" coating condition for the entire tank.

2.2.2 "Areas of consideration" are illustrated in Figures 2.2-1, 2.2-2, 2.2-3.

Fig. 2.2-1 Typical areas in a wing ballast tank¹**Note 1:****SINGLE HULL OIL TANKER - WING BALLAST TANKS****Deck and bottom**

Areas of deck and bottom plating with adjacent structure (one (1) area to consider for deck and one (1) area to consider for bottom).

Side shell and longitudinal bulkheads

Areas of side shell and longitudinal bulkheads with attached structure, in lower, middle and upper third (three (3) areas to consider for side shell and three (3) areas to consider for longitudinal bulkhead).

Transverse bulkheads (forward and aft)

Areas of transverse bulkhead and attached stiffeners, in lower, middle and upper third (three (3) areas to consider for forward transverse bulkhead and three (3) areas to consider for aft transverse bulkhead).

DOUBLE HULL OIL TANKER**Double bottom ballast tank**

Areas of tank boundaries and attached structure, in lower and upper half of tank (two (2) areas to consider).

Wing ballast tank**Deck and bottom**

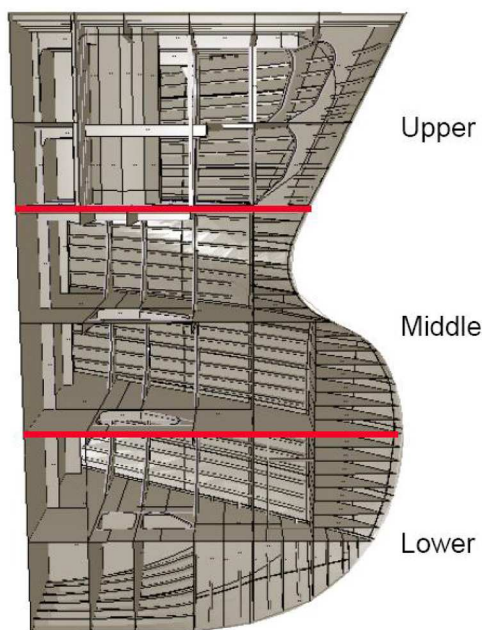
Areas of deck and bottom plating with attached structure (one (1) area to consider for deck and one (1) area to consider for bottom).

Side shell and longitudinal bulkheads

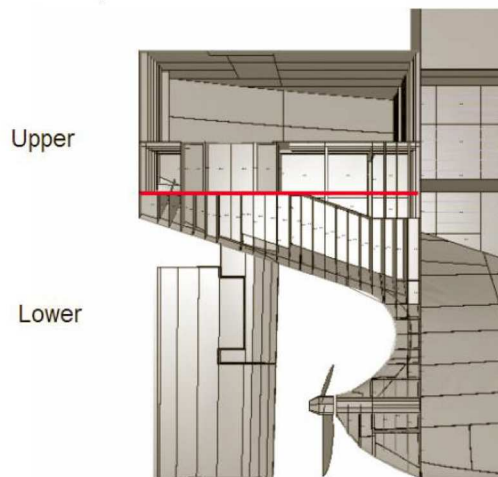
Areas of side shell and longitudinal bulkheads with attached structure, in lower, middle and upper third (three (3) areas to consider for side shell and three (3) areas to consider for longitudinal bulkhead)

Transverse bulkheads (forward and aft)

Areas of transverse bulkhead and attached stiffeners, in lower, middle and upper third (three (3) areas to consider for forward transverse bulkhead and three (3) areas to consider for aft transverse bulkhead).

Fig. 2.2-2 Typical areas in forepeak ballast tank²**Note 2:****FOREPEAK TANK**

Areas of tank boundaries and attached structure, in upper, middle and lower third of tank (three (3) areas to consider).

Fig. 2.2-3 Typical areas in afterpeak ballast tank³**Note 3:****AFTERPEAK TANK**

Areas of tank boundaries and attached structure, in lower and upper half of tank (two (2) areas to consider).

2.2.3 Figs 2.2.3-1 to 2.2.3-4 show areas under consideration of ships other than oil tankers:

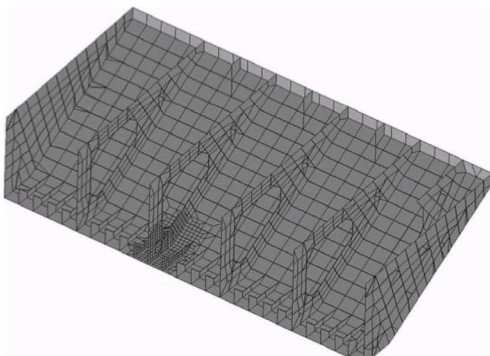


Fig. 2.2.3-1. Topside tanks

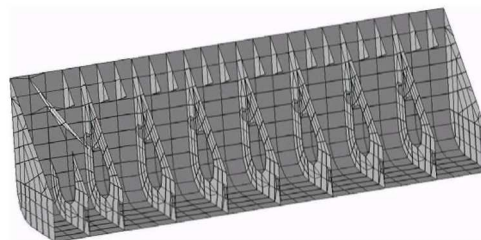


Fig. 2.2.3-2. Hopper tanks

TOPSIDE TANKS:

Deck, vertical/slope/horizontal plates

Bounding structures of the tank (deck, vertical strake/slope/horizontal plates) with attached structure (one (1) area to consider for deck and vertical/slope strake with attached structure and one area to consider for horizontal plate with framing)

Side shell

Side shell with attached structure, in lower and upper or in lower, middle and upper depending on the vertical height (two areas to consider for side shell, but if the vertical height is more than 15 m, three areas to consider).

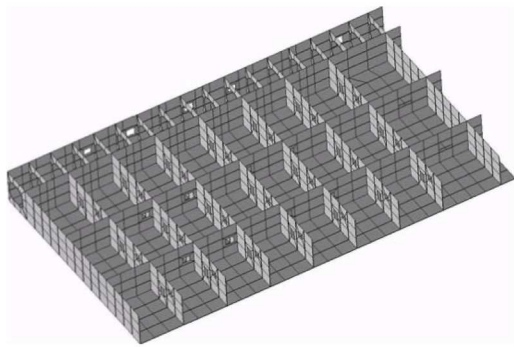


Fig. 2.2.3-3. Double bottom tanks

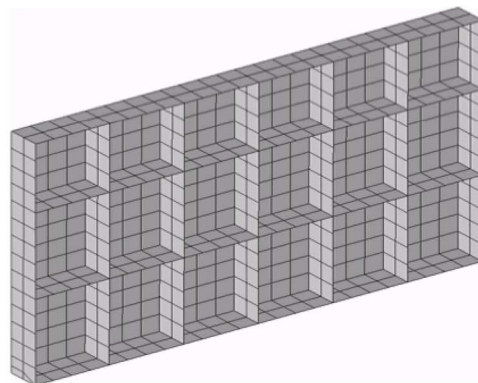


Fig. 2.2.3-4. Side tanks

Transverse bulkheads (forward and aft)

Areas of transverse bulkhead and attached stiffeners, in lower and upper or in lower, middle and upper depending on the vertical height (two areas to consider for forward transverse bulkhead and aft transverse bulkhead, but if the vertical height is more than 15 m, three areas to consider).

HOPPER TANKS**Hopper, bottom girder and bottom**

Areas of hopper, bottom girder and bottom plating with attached structure (one area to consider for bottom plating and bottom girder with attached structure and one area to consider for hopper).

Side shell

Side shell, including bilge plating, with attached structure, in lower and upper or in lower, middle and upper depending on the vertical height (two areas to consider for side shell, but if the vertical height is more than 15 m, three areas to consider).

Transverse bulkheads (forward and aft)

Areas of transverse bulkhead and attached stiffeners, in lower and upper or in lower, middle and upper depending on the vertical height (two areas to consider for forward transverse bulkhead and aft transverse bulkhead, but if the vertical height is more than 15 m, three areas to consider).

DOUBLE BOTTOM TANKS

Double bottom tanks areas of tank boundaries and attached structure, in lower and upper half of tank (two areas to consider).

SIDE TANKS

Deck and bottom areas of deck and bottom plating with attached structure (one area to consider for deck and one area to consider for bottom).

Side shell and longitudinal bulkheads

Side shell and longitudinal bulkheads with attached structure, in lower and upper or in lower, middle and upper depending on the vertical height (two areas to consider for side shell, but if the vertical height is more than 15 m, three areas to consider).

Transverse bulkheads (forward and aft)

Areas of transverse bulkhead and attached stiffeners, in lower and upper or in lower, middle and upper depending on the vertical height (two areas to consider for forward transverse bulkhead and aft transverse bulkhead, but if the vertical height is more than 15 m, three areas to consider).

Forepeak tanks

Areas of tank boundaries and attached structure in upper and lower or upper, middle and lower depending on the vertical height (two areas to consider for fore peak tanks, but if the vertical height is more than 15 m, three areas to consider) (refer to Fig. 2.2-2).

After peak tanks

Areas of tank boundaries and attached structure in upper and lower (two areas to consider) (refer to Fig. 2.2-3).

Notes: 1. Each area includes plating and attached structural members.

2. A tank configuration which is combined with two or more tanks may be dealt with in separate in accordance with its unit shape of tank configuration, e.g., a tank which has a combination figure of a hopper tank and a double bottom tank or a tank which is combined with a wing tank, a side tank and a hopper tank.

3. For fore peak tank or after peak tank, which consists of ballast tank and void space, they should be separately considered. It is important to note that void spaces are not considered under these Guidelines.

If the vertical height of ballast tanks other than double bottom tanks, fore peak tank, and after peak tank is more than 15 m, it shall be divided into three areas under consideration as shown in Table 2.

When deciding the boundary between lower/(middle)/upper parts for areas under consideration of the vertical surface, other than dividing the vertical surface equally by the number of areas decided according to Table 2, the conspicuous structural member(s) such as stringers and/or horizontal girders on bulkheads or side shell may be the boundary, which should be mentioned in the report.

Table 2

Maximum vertical height (h)	Areas under consideration (vertical)
$h < 15$ m	Two areas (lower/upper)
$h > 15$ m	Three areas (lower/middle/upper)

2.3 Examples of assessment of coating condition

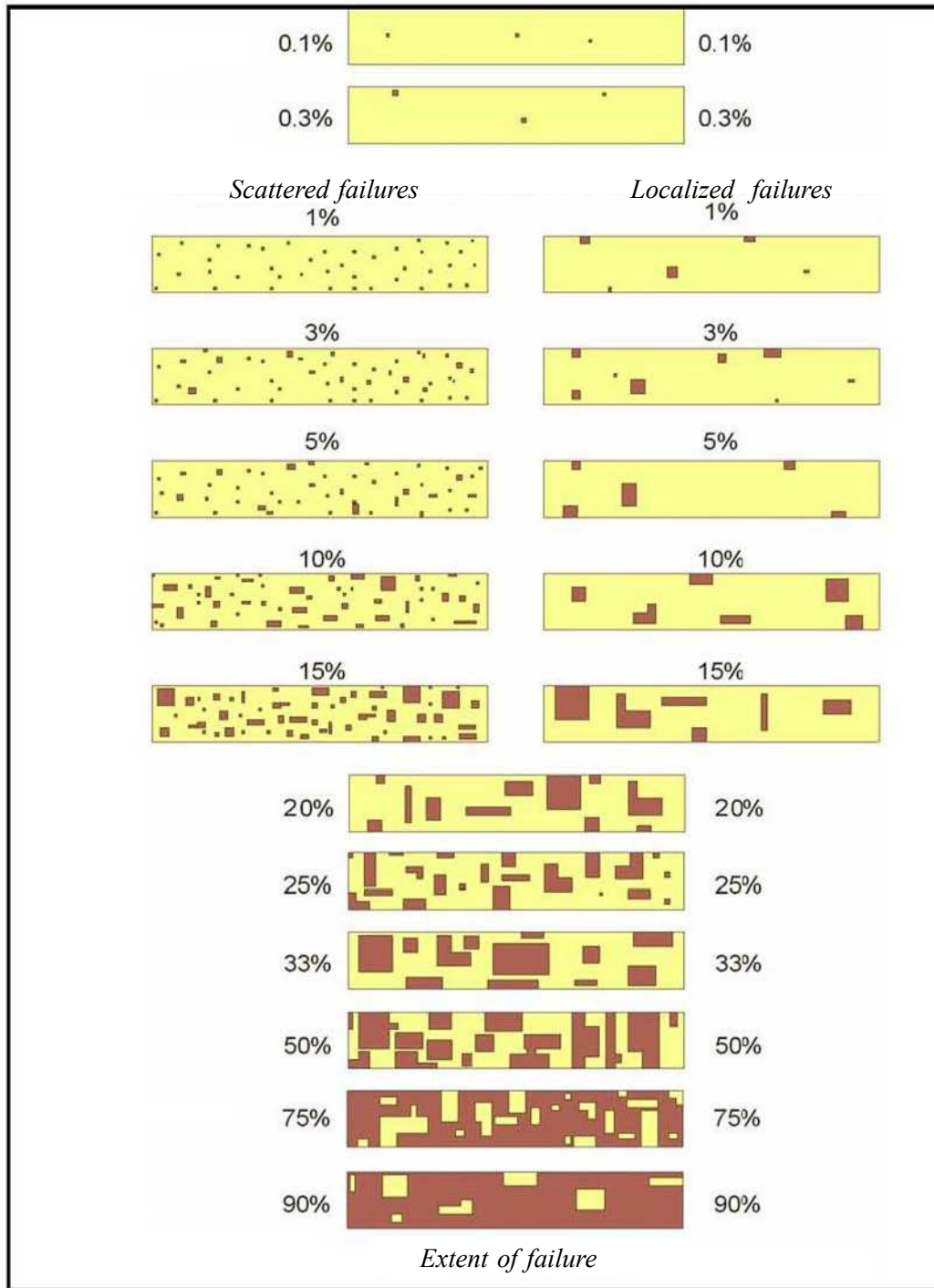


Fig. 2.3-1 Assessment scale for breakdown

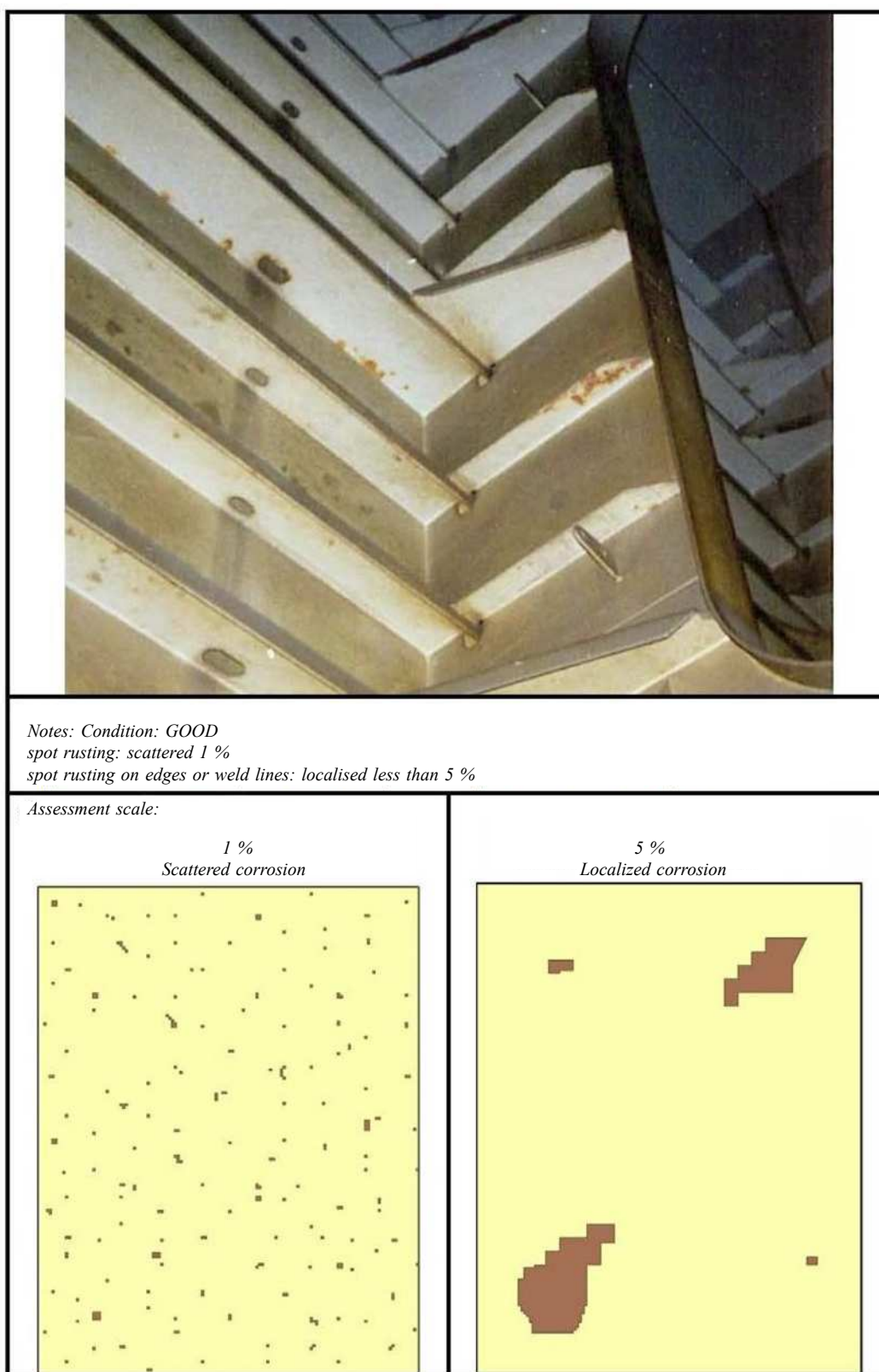


Fig. 2.3-2 Coating condition evaluation

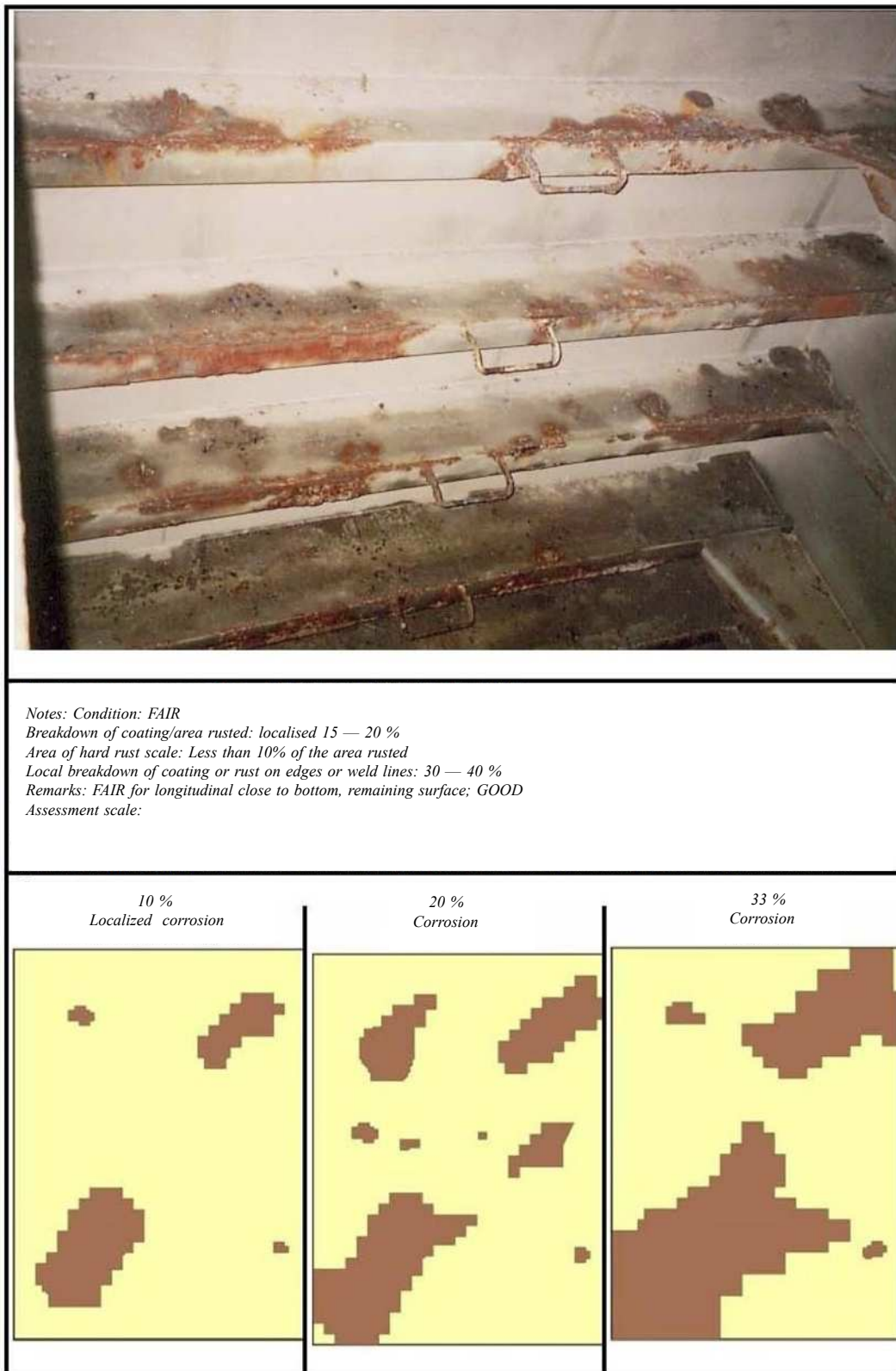


Fig. 2.3-3 Coating condition evaluation



Notes: Condition: POOR

Breakdown of coating/area rusted: approx. 30 %

Area of hard rust scale: More than 10 % of the area rusted

Local breakdown of coating or rust on edges or weld lines: 30 — 40%

Assessment scale:

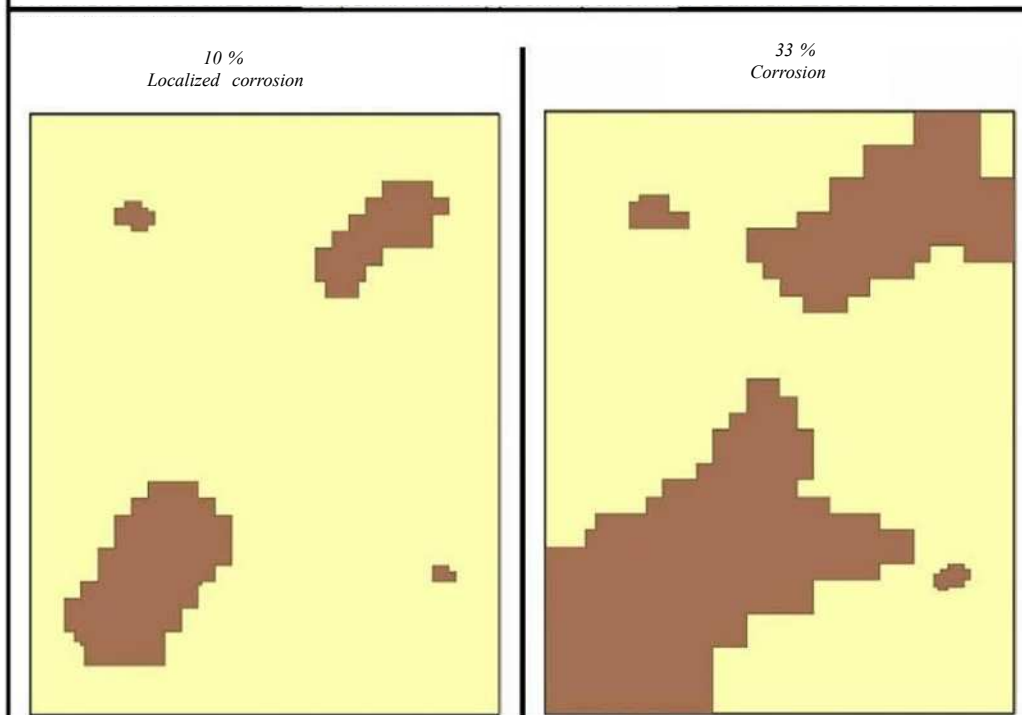


Fig. 2.3-4 Coating condition evaluation

2.4 Illustrated samples of Coating Condition Evaluation



GOOD COATING CONDITION



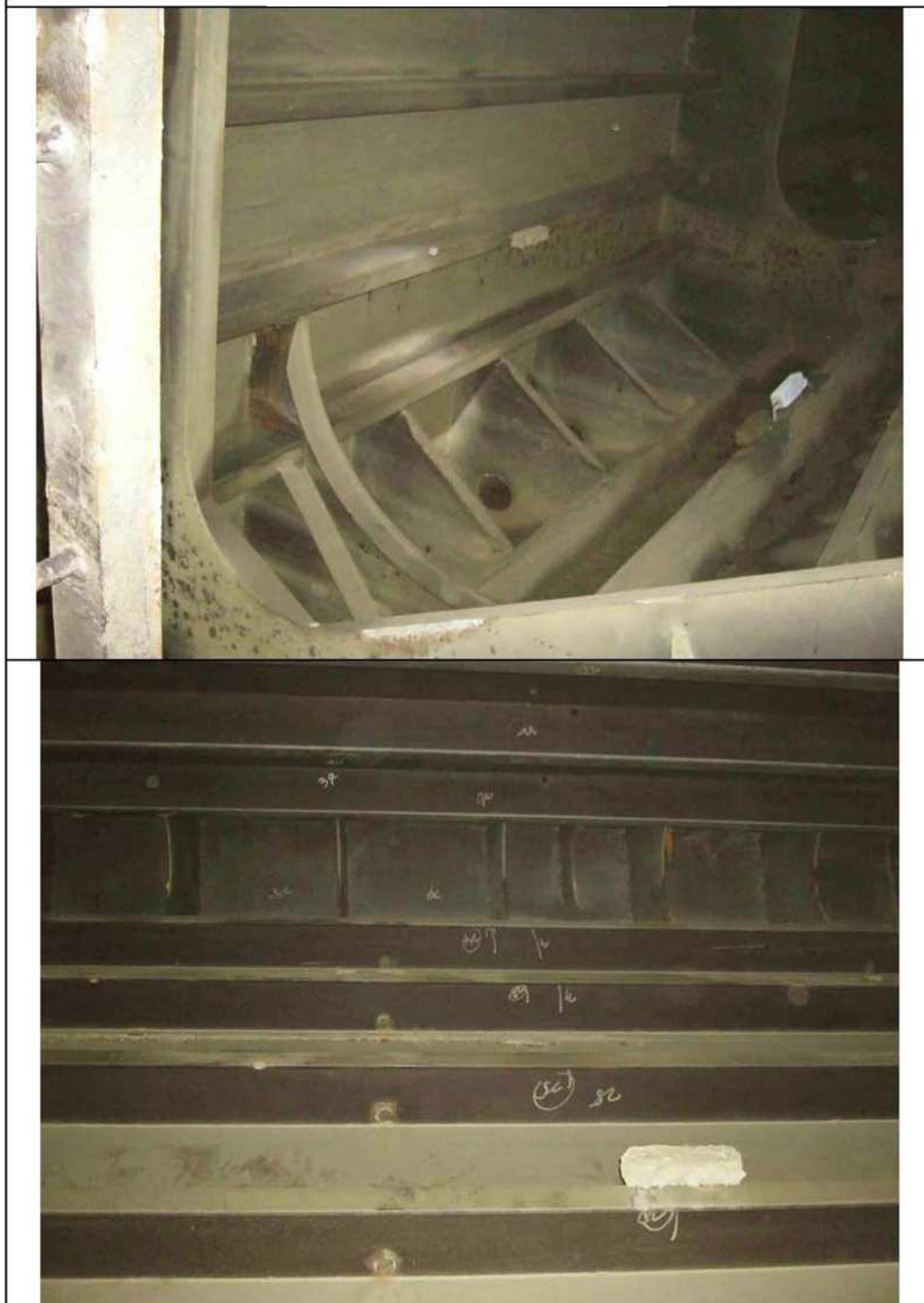
GOOD COATING CONDITION



GOOD COATING CONDITION



GOOD COATING CONDITION



*TRANSITION GOOD TO FAIR COATING CONDITION:
THIS IS A GOOD CONDITION*



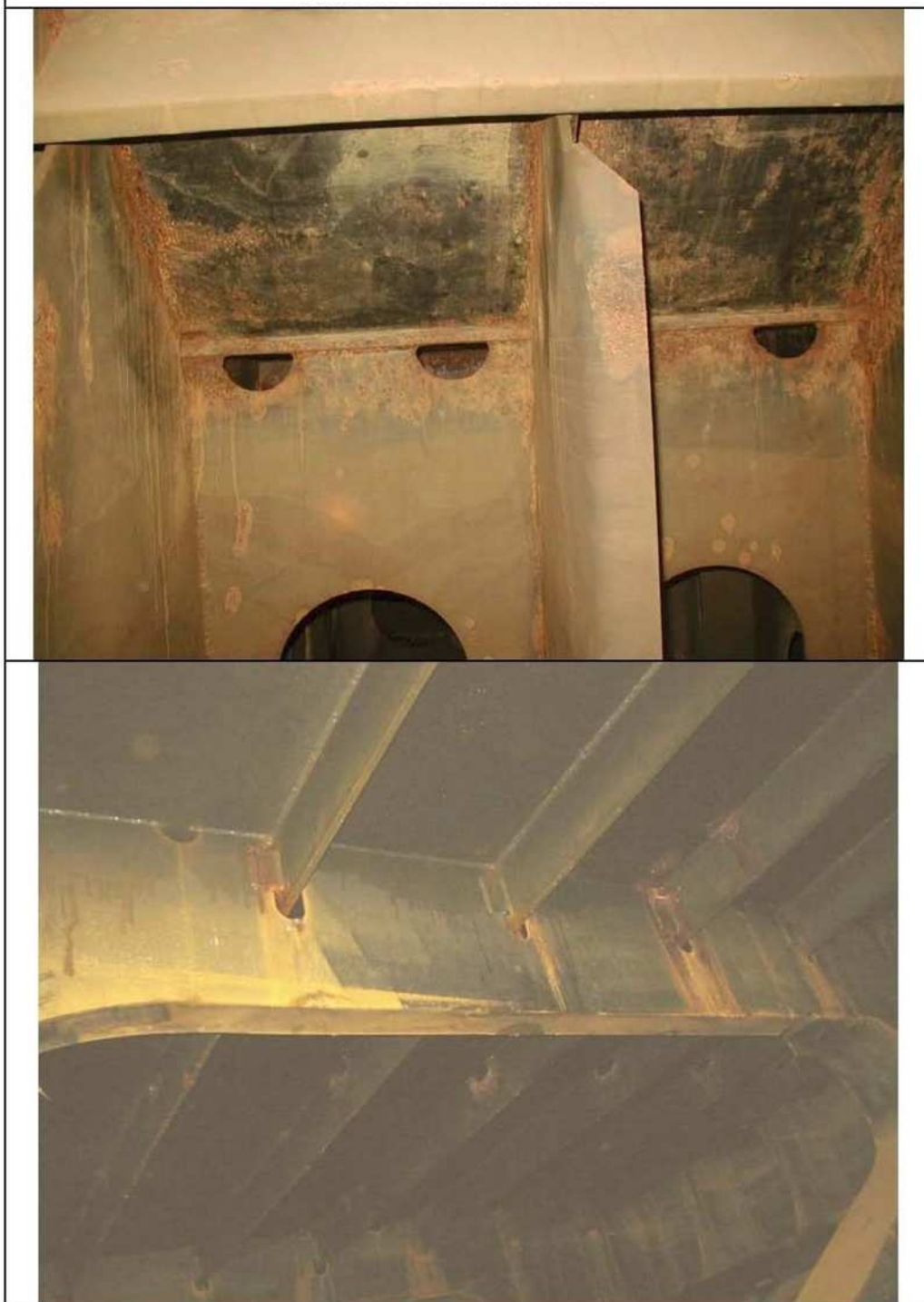
FAIR COATING CONDITION



FAIR COATING CONDITION



FAIR COATING CONDITION



FAIR COATING CONDITION



FAIR COATING CONDITION



-----*TRANSITION FAIR TO POOR COATING CONDITION:*-----
THIS IS A FAIR CONDITION



-----*TRANSITION FAIR TO POOR COATING CONDITION:*-----
THIS IS A FAIR CONDITION



*TRANSITION FAIR TO POOR COATING CONDITION:
THIS IS A POOR CONDITION*



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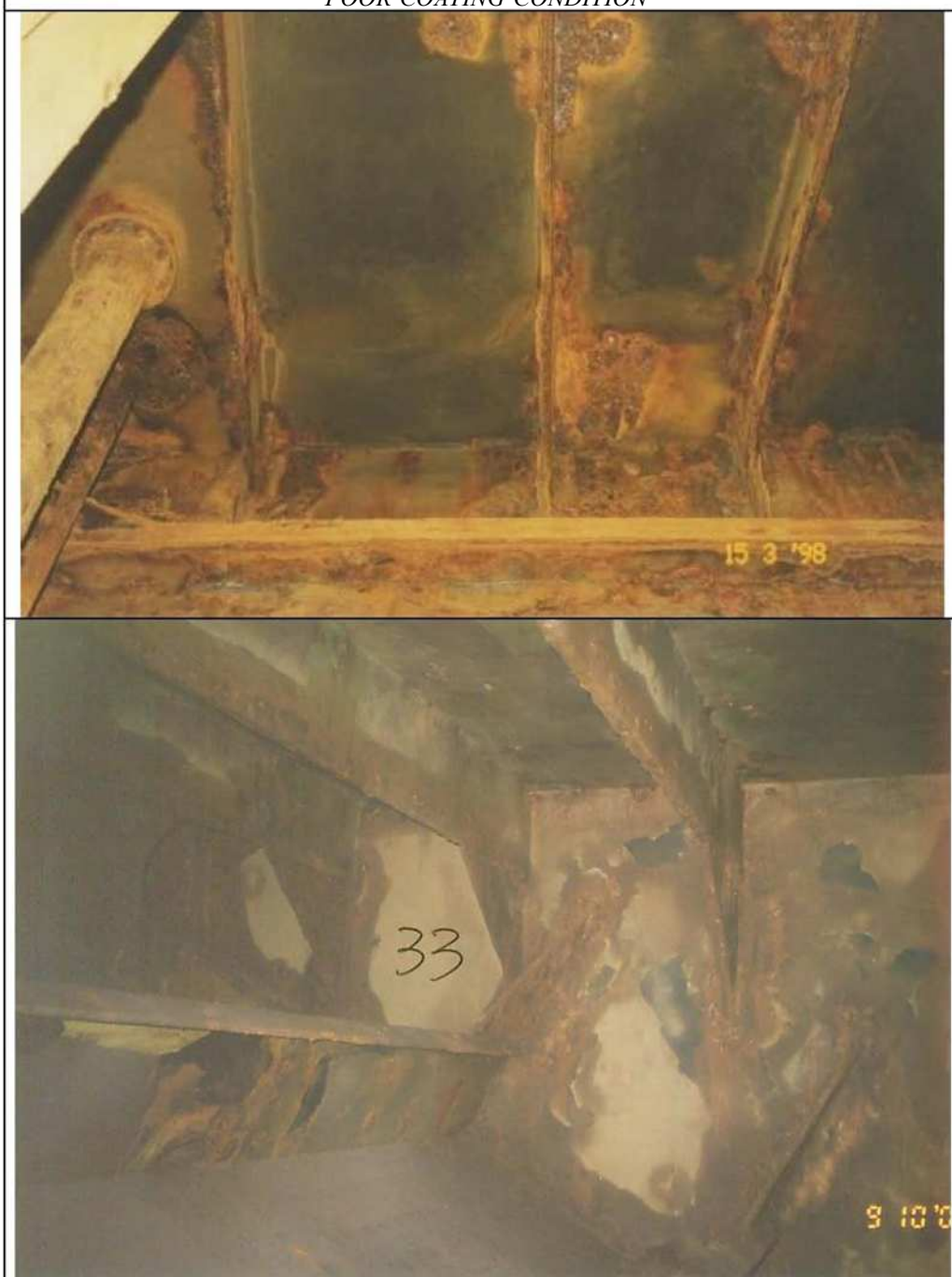
POOR COATING CONDITION



POOR COATING CONDITION



POOR COATING CONDITION



POOR COATING CONDITION



POOR COATING CONDITION



53. GUIDELINES FOR THE SURVEY OF OFFSHORE MOORING CHAIN CABLE IN USE

Guidelines for the survey of offshore mooring chain cable in use in accordance with IACS Recommendation No. 38.

1 APPLICATION AND PURPOSE

The information herein is intended to provide guidance to Surveyors for inspection of position mooring systems which have been classed by the Society for Mobile Offshore Drilling Units.

Temporary mooring equipment is to be surveyed under the Rules for Building and Classing Steel Vessels of the Classification Society.

2 SURVEY INTERVAL AND SCOPE

2.1 Annual Surveys shall be carried out at approximately twelve (12) month intervals, with the ship at operational draft, with the position mooring system in use.

2.1.1 The purpose of the Annual Survey is to confirm that the mooring system will continue to carry out its intended purpose until the next annual survey. No disruption of the unit's operation is intended. Ideally, the Annual Survey would be done during a relocation move.

2.1.2 The scope of the Annual Survey is limited to the mooring components adjacent to the winch or windlass. Depending on the mooring component visible from the unit, particular attention shall be given to:

Chain

Wear on the chain shoulders in way of the chain stopper and windlass pockets;

Support of chain links in the windlass pockets.

Wire Rope

flattened ropes;

broken wires;

worn out or corroded ropes.

The surveyor shall determine if any problems have been experienced in the previous twelve (12) months period with the mooring system, e.g. breaks, mechanical damage, loose joining shackles, chain or wire jumping.

If the Annual Survey reveal severe damage or neglect to the visible part of chain or cable, a more extensive survey should be performed.

Typical damage warranting a more comprehensive survey could be:

chain reduction in diameter exceeding 4 %,

missing studs,

loose studs in Grade 4 chain;

worn out cable lifters (i.e. gypsies) causing damage to the chain;

wire rope (obvious flattening or reduction in area;

worn cable lifters causing damage to the wire rope;

severe wear or corrosion,

broken wires).

2.2 Special Periodical Surveys are carried out at intervals of approximately five (5) years and will require extensive inspection, usually associated with a sheltered water visit. When considered necessary by the Society, the interval between Special Periodical Surveys may be reduced.

2.2.1 The purpose of the Special Periodical Survey is to ensure that each chain is capable of performing its intended purpose until the next Special Periodical Survey, assuming that appropriate care and maintenance is performed on the mooring system during the intervening period.

2.2.2 The Special Periodical Survey shall include:

- close visual examination of all links of mooring chains, with cleaning as required,
- enhanced representative NDT sampling:
- 5 per cent on general chains;
- 20 per cent on chain which has been in way of fairleads over last five (5) years;
- all connecting links;
- Dimension checks, including length over five (5) links.

2.2.3 Particular attention shall be given to:

those lengths of chain (or wire rope) which have frequently been in contact with the windlass and fairleads during the unit's operation since the last survey. The RS Surveyor shall ensure that these lengths are complying with the RS requirements and may be used in the way of the windlass and fairlead;

the looseness and pin securing arrangements of the joining-shackles;

all windlass and fairlead chain pockets for:

unusual wear or damage to pockets;

rate of wear on pockets, including relative rate of wear between links and pockets;

mis-match between links and pockets, and improper support of the links in the pockets.

A functional test of the mooring system during anchor-handling operation for:

smooth passage of chain links and/or wire rope and joining-shackles over the windlass and fairleads pockets;

the absence of chain jumping or other irregularities.

2.2.4 The thickness (diameter) of approximately 1 per cent of all chain links shall be measured. The selected links shall be approximately uniformly distributed through the working length of the chain. The above percentage may be increased/decreased if the visual examination indicates excessive/minimal deterioration..

2.2.5 All joining-shackles of the Kenter type and bolted type which have been in service for more than four (4) years should be dismantled and an MPI performed on all machined surfaces according to 8.2.

2.3 Special Continuous Surveys

In lieu of a special periodic survey, the owner may opt for a Continuous Survey, by providing an extra mooring line which may be regularly inspected on shore and exchanged with lines installed on the unit on an annual or other appropriate schedule.

3 ANCHOR INSPECTION

The anchor head, flukes and shank should be examined for damage, including cracks or bending. The anchor shackle pin and crown pin should be examined and renewed if excessively worn or bent. Moveable flukes should be free to rotate between stops on the anchor head.

Bent flukes or shanks should be heated and jacked back in place according to an approved procedure, followed by Magnetic Particle Inspection.

4 ANCHOR SWIVELS

Although swivels are no longer in common use, anchors have been lost due to corrosion of the threads engaging the swivel nut. These threads should be carefully examined and, if significant corrosion is found, the swivel should be removed or replaced.

5 CHAIN INSPECTION CRITERIA

5.1 Chain types considered

This section applies only to "Offshore" or "Rig Quality" chains with studs secured by one of the following means:

Mechanically locked adjacent to the link's (IACS R3 chain for flash-butt-weld and fillet welded on the other end; example);

Studs mechanically locked in place on both ends (IACS R4 chain for example)

Other types of chains are subject of special consideration.

The service environment of offshore mooring chain is more severe than the service environment for conventional ship anchoring chain. Offshore chain is exposed to service loads for a much longer period of time. The long term exposure to cyclical loadings in sea water magnifies the detrimental effect of geometric and metallurgical imperfections on fatigue life. Moreover the increased number of links in offshore chains renders the chain more susceptible to failure from a statistical standpoint.

5.2 Chain link diameter loss due to abrasion and corrosion

Diameter measurements should be taken in the curved or bend region of the link and at any area with excessive wear or gouging. Particular attention should be given to the 'shoulder' areas which normally contact the windlass or fairlead pockets.

Links with minimum cross-sectional area less than 90 % of the original nominal area should be rejected. If repair is permitted, it should be done by qualified personnel using an approved procedure.

Note. WELD REPAIR IS NOT PERMITTED ON IACS R4, R4S and R5 CHAIN (refer to para 5.3.1).

A 5 per cent reduction in diameter is equivalent to 10 per cent of the reduction in cross-sectional area to original.

Two diameter measurements should be taken 90 degrees apart and the average compared with original diameter considering with allowable diminution.

5.3 Chain stud defects and repair or replacement

Studs prevent knots or twist problems during chain handling and support the sides of the links under load to reduce stretching and bending stresses, resulting in longer fatigue life. Links with missing studs should be removed or the studs should be refitted using an approved procedure.

5.3.1 Chain studs secured by fillet welds on one end.

The stud is likely to fall out if it is loose or the weld is cracked.

Any axial or lateral movement is unacceptable and the link must be repaired or replaced.

Links with studs fillet welded on the flash-butt-weld end of the stud are unacceptable.

Rejection of links with gaps exceeding 3 mm (1/8 inch) between the stud and the link at the flash-butt-weld end of the stud should be considered. Closing the gap by renewing the fillet weld may be considered, where permitted.

Field repair of cracked welds should be avoided. Welding must be performed by qualified personnel using approved by RS procedures.

Note. WELD REPAIR IS NOT PERMITTED ON IACS R4, R4S and R5 CHAIN.

Chains with studs mechanically locked in place on both ends may only be repaired by an approved mechanical 'squeezing' procedure to reseal the stud.

Fillet welding of studs on both ends is not acceptable nor is welding on the stud end adjacent to the link's flash-butt-weld.

Existing studs with fillet welds on both ends will require special consideration and will be subject to special crack detection efforts. A reduction in mechanical properties in way of the flash-butt-weld will normally be required and approval of the coastal Administration may also be required.

5.3.2 Chain studs secured by press fitting and mechanical locking.

It is very difficult to quantify excessive looseness of chain studs. The decision to reject or accept a link with a loose stud must depend on the surveyor's judgment of the overall condition of the chain complement.

Axial movement of studs of 1 mm or less is acceptable. Links with axial movement greater than 2 mm must be repaired by 'squeezing' or removed. Conformity of chain links with axial movements from 1 to 2 mm must be evaluated based on the environmental conditions of the unit's location and expected period of time before the chain is again available for inspection.

Lateral movement of studs up to 4 mm is acceptable.

5.4 Link repairs

Cracks, gouges and other surface defects (excluding weld cracks) may be removed by grinding provided the resulting reduction in link diameter does not exceed 5 % and the crosssectional area, due to abrasion, wear, and grinding is at least 90 per cent of the original nominal area. Cross-sectional area should be calculated for the lowest average of two diameters taken 90 degrees apart.

Links with surface defects which cannot be removed by grinding should be replaced.

5.5 Chain link replacement

Defective links should be removed and replaced with joining-shackles, i.e. connecting links, guided by the following good marine practice:

The replacement joining-shackle should comply with IACS W22.

Joining-shackles should pass through fairleads and windlasses in the horizontal plane.

Since joining-shackles have much lower fatigue lives than ordinary chain links as few as possible should be used. On average, joining-shackles should be by 122 m (400 ft) or more apart.

If a large number of links meet the discard criteria and these links are distributed in the whole length, the chain should be replaced with new chain.

6 FAIRLEAD AND WINDLASS INSPECTION — CHAIN SYSTEMS

6.1 Fairleads

The fairleads shall be thoroughly examined by the RS Surveyor.

6.2 Windlasses

Special attention shall be given to the holding ability of the windlass. The chain stopper and the resultant load path to the unit's structure should be inspected and its soundness verified.

6.3 Chain pockets and chain support

It is essential that a link resting in a chain pocket makes contact with the fairlead at only the four shoulder areas of the link to avoid critical bending stresses in the link. Satisfactory chain support is to be verified, and excessive wear in the pockets should be repaired as required, to prevent future damage to the chain. Chain pockets may be repaired by welding in accordance with the standard procedures supplied by the fairlead/windlass manufacturer. Normally, the hardness of the pockets should be slightly softer than the hardness of the chain link, and procedures must be specific for the chain quality used.

7 FAIRLEADS AND WINCHES INSPECTION — WIRE ROPE SYSTEMS

7.1 Fairleads

Refer to 6.1.

7.2 Winches

Special attention shall be given to the holding ability of the winch and the satisfactory operation of the pawls, ratchets and braking equipment. The soundness of the resultant load path to the unit's structure should be verified.

Proper laying down of the wire on the winch drum should be verified to the satisfaction of the Surveyor, and drums and spooling gear adjustments made, if required.

8 INSPECTION OF JEWELLERY AND MISCELLANEOUS FITTINGS

8.1 General

Anchor shackles, large open links, swivels and connecting links shall be visually inspected.

Certain areas shall be examined by MPI. Areas to be examined shall be clearly marked on each item. Links and fittings should be dismantled, as required. Damaged items should be replaced as required by the attending surveyor.

General guidance on the areas requiring MPI is provided below:

Large open links: the interior contact surfaces of large open links;

Bolted shackles: the inside contact areas and the pins;

Swivels: the swivel pin and threads and mating surface.

8.2 Joining shackles (connecting links)

8.2.1 Experience has shown that an undue number of anchors and chains have been lost due to connecting link failure. Joining-shackles used for higher strength chains, such as ORQ and above, which do not have certificates of equivalent quality shall receive special attention.

8.2.2 Magnetic Particle Inspection

All joining-shackles of Kenter or similar design which have been in service for more than four (4) years should be dismantled and MPI carried out.

General guidance on the areas requiring MPI is provided below:

joining shackle links: all machined and ground surfaces of the link and the sides of the curved portions of the link;

joining shackle stud: machined surfaces only;

joining shackle pin: 100 per cent.

8.2.3 Fatigue is considered to be the critical criteria in way of the machined surfaces. On the remaining surface, the profile should be ground smooth and MPI should be carried out upon completion of grinding. In general, the radius of the completed grinding operation should produce a recess with a minimum radius of 20 mm and a length along the link bar greater or equal to six times its depth.

Note. Sandblasting prior to MPI may damage the machined surfaces and shall be avoided. Alternative methods of cleaning shall be used. The maximum permissible depth of grinding is 5 per cent of the nominal diameter. The minimum acceptable cross-sectional area in way of the grinding repair, due to the combined effect of local grinding and general corrosion/abrasion is 90 per cent of the nominal cross-sectional area.

The minimum acceptable diameter in way of the grind repair, due to the combined effect of local grinding and general corrosion/abrasion, is 95 per cent of the nominal diameter.

8.2.4 General corrosion/abrasion.

The minimum acceptable cross-sectional area due to generally uniform corrosion/abrasion is 90 per cent of the nominal cross-sectional area (equivalent to an uniform 5 per cent reduction in diameter).

8.2.5 Tapered pins holding the covers of connecting links together should make good contact at both ends and the recess of counterbore at the large end of the pin holder should be solidly plugged with a peened lead slug to prevent the pin from working out.

8.2.6 Looseness upon re-assembly.

Any joining-shackles of Kenter or similar designs which are loose upon re-assembly should be accepted only after special consideration in each case.

Note. Looseness between the mating faces will significantly reduce the remaining fatigue life of a joining-shackle. Stud movement in the longitudinal direction of the stud of more than 0,5 mm is also likely to significantly reduce the remaining fatigue life of a joining-shackle.

9. WIRE ROPE SURVEYS

9.1 Acceptance criteria

Acceptance criteria should be guided by ISO 4309.

It shall be borne in mind that ISO 4309 is primarily intended for lifting appliances where the Factor of Safety may be higher than for mooring wires.

The RS Surveyor shall exercise great care in his interpretation of the condition of the wire. An obvious acceptance or rejection is comparatively easy, but the "grey" area between is difficult to evaluate. The RS Surveyor has to make a sound evaluation and technical judgment based on all available evidence.

In general, the age or time in service of the wire does not directly have a bearing on the acceptance or rejection of the wire other than as a factor to be taken into consideration by the RS Surveyor when deciding on the extent of survey.

9.2 Survey and inspection

100 per cent visual examination and diameter measurements shall be performed.

9.2.1 Visual examination should identify and record the following items for each steel wire anchor line:

- the nature and number of wire breaks;
- wire breaks at the termination;
- external wear and corrosion;
- localized grouping of wire breaks;
- deformation;
- fracture of strands;
- termination area;
- reduction of rope diameter, including breaking or extrusion of the core.

9.2.2 Diameter measurements shall be taken at approximately 100 m intervals, at the discretion of the attending Surveyor. If areas of special interest are found, the survey may be concentrated on these areas and diameter measurements taken at much smaller intervals.

9.2.3 An internal examination should be undertaken as far as practicable if indications of severe internal corrosion or possible breakage of the core or wire breaks in underlaying areas.

9.3 Guidance on wire rope damage

The cause of wire rope failures may be deduced from the observed damage to the rope. The information summarized below covers most types of wire rope failure.

More detailed information, including photographic examples, is available in ISO.

9.3.1 Broken wires at the termination indicate high stresses at the termination and may be caused by incorrect fitting of the termination, fatigue, overloading or mishandling during deployment or retrieval.

Distributed broken wires may indicate the reason for their failure.

Crown breaks or breakage of individual wires at the top of strands may be caused by excessive tension, fatigue, wear or corrosion.

Excessive tension is indicated by necking down of the broken end of the wire.

Fatigue is indicated by broken faces perpendicular to the axis of the wire.

Corrosion and wear may be indicated by reduced cross sections of the wire.

Valley breaks, at the interface between two strands indicate tightening of the strands, usually caused by a broken core or internal corrosion which has reduced the diameter of the core.

Valley breaks can be caused by high loads, tight sheaves, and sheaves of too small a diameter.

Locally grouped broken wires in a single strand or adjacent strand may be due to local damage. Once begun, this type of damage will usually worsen.

9.3.2 Changes in rope diameter can be caused by external wear, interwire and interstrand wear, stretching or corrosion.

A localized reduction in rope diameter may indicate a break in the core. Conversely, an increase in rope diameter may indicate a swollen core due to corrosion.

9.3.3 Wear on the crown of outer strands in the rope may be caused by rubbing against fairleads, unit structure, or the sea bed depending on the location of the wear.

Internal wear between individual strands and wires in the rope is caused by friction and is accelerated by bending of the rope and corrosion.

9.3.4 Corrosion decreases rope strength by reducing the cross-sectional area and accelerated fatigue by creating an irregular surface which invites stress cracking. Corrosion is indicated by:

the diameter of the rope at fairleads will grow smaller;

the diameter of stationary ropes may actually grow larger, due to rust under the outer layer of strands.

Diameter growth is rare for mooring lines.

9.3.5 Deformation, i.e. distortion of the rope from its normal construction, may result in an uneven stress distribution in the rope. Kinking, bending, scrubbing, crushing and flattening are common wire rope deformations. Ropes with slight deformations will not lose significant strength. Severe distortions can accelerate rope deterioration and lead to premature failure.

9.3.6 Thermal damage, although rare for mooring ropes in normal service, may be indicated by discoloration. Prompt attention should be given to damage caused by excessively high or low temperatures. The effect of very low temperatures on wire rope is unclear except for the known detrimental effect on lubricants.

9.4 Limits of wear

9.4.1 A wire rope shall not be used if:

.1 5 per cent and more of the total number of wires in the rope are broken in any length equal to 10 times the rope diameter;

.2 there is any tendency towards birdcaging (i.e. separation of the strands or wires);

.3 a strand is broken;

.4 excessive wear is present which manifests itself by flat wire surfaces;

.5 it shows signs of corrosion, particularly of the internal corrosion;

.6 broken wires appear in one stand only or are concentrated in a shorter length of rope than ten diameters or appear in the tucks of a splice;

.7 there is more than one broken wire immediately adjacent to a compressed metal ferrule (pressed clamp/ bush) or fitting;

.8 steel wire diameter is less than 90 per cent of the initial value.

54. INSTRUCTIONS FOR SURVEYS OF SHIPS EQUIPPED WITH INFLATABLE LIFERAFTS WITH EXTENDED SERVICE INTERVALS

1. GENERAL

1.1. These Instructions shall be applied by the Register during surveys of equipment of ships, performed upon authorisation of the Russian Federation MA in cases if these ships are equipped with liferafts of types (brands) accepted by that MA for application with extended service intervals.

1.2. The Instructions may be used during surveys of equipment and outfit of ships, performed upon authorisation by another Flag State MA, if that MA accepts an application of liferafts with extended service intervals and other conditions of their approval and application are not specified.

1.3. The present Instructions establish the minimum scope of additional inspections to be performed by surveyors in relation of liferafts with extended service intervals in accordance with the requirements of Regulation III/20.8.3 of SOLAS-74 as amended, as amended, and provisions of IMO circular MSC.1/Circ.1328 "Guidelines for the Approval of Inflatable Liferafts Subject to Extended Service Intervals not Exceeding 30 months". When the applicable requirements have nonconformities, the RS surveyor shall be entitled to require additional inspections, maintenance, testing, repair or replacement of the equipment or its components.

1.4 Unless otherwise is stated by the Flag State MA, the liferafts with extended service intervals may be used on ships if the following conditions are met:

.1 for the first 10 years of the liferaft service life (from the date of its manufacture) the interval between its servicing at the recognized servicing stations shall not exceed 30 months. After 10-year service life, the liferaft is subject to its service at the recognized Servicing Stations at an interval of 12 months required by Regulation 111/20.8.1.1 of SOLAS-74 as amended;

.2 servicing of liferaft shall be carried out at the recognized Servicing Stations, that have been appointed for this purpose by the manufacturer, and in accordance with IMO resolution A.761 (18) with account of the provisions of IMO MSC.1/Circ.1328;

.3 onboard a ship the liferaft shall be inspected at intervals not exceeding 12 months between the inspections in compliance with the provisions of IMO circular MSC.1/Circ.1328 as well as the manufacturer's instructions. Onboard inspections shall be carried out by the inspection personnel trained and certified for this purpose by the manufacturer. The results shall be entered in the inspection log-book to be kept on board;

.4 if the annual onboard inspection of liferaft reveals the excess of humidity inside its tight packing, the liferaft shall be serviced and repacked at the recognized Servicing Station within three months of the date of onboard inspection or within the interval not exceeding 30 months from the date of the recent periodic service, whichever is earlier. If the annual onboard inspection reveals a loss of inflation gas from gas inflation system, the liferaft shall be immediately serviced at the recognized Servicing Station.

2. SURVEY PERFORMANCE

2.1 To confirm the fulfilment of the conditions specified in 1.4, during periodical surveys prescribed for the relevant ship's certificates, and, if applicable, during additional (occasional) surveys, the surveyor shall check the availability of the following:

Type Approval Certificate confirming that construction, arrangement and packing of the inflatable liferaft provide the extended service interval between its periodical service in compliance with Regulation III/20.8.3 of SOLAS-74 as amended and IMO circular MSC.1/Circ.1328;

the Certificate confirming the product has been manufactured according to the approved type under the RS technical supervision or a similar document in compliance with the RS rules and regulations;

marking on liferaft's container, enabling to identify it by type, trade mark, serial number, etc;

additional marking on liferaft's container, indicating that it has been approved and certified for extended service intervals in compliance with IMO circular MSC.1/Circ.1328;

the manufacturer's maintenance and inspection instructions for the liferaft in accordance with Regulation III/36 of SOLAS-74 as amended. The contents of the instructions shall correspond with the type and trade mark of liferafts installed on the ship;

special arrangements or appliances for safe repositioning of a liferaft to ensure access, if required, during annual on board inspections;

tools and measuring equipment, providing during annual onboard inspections the evaluation of humidity around the liferaft and behind its protective barrier, as well as detection of possible leakages of inflation gas from the gas inflation system, in accordance with the manufacturer's instructions and with the required accuracy;

documents confirming that the recent liferaft service was carried out at the recognized Servicing Station in the scope under IMO resolution A.761(18) (also refer to Annex 18 to the Guidelines) considering the provisions of Section 6 of Annex to IMO circular MSC.1/Circ.1328, not in exceed of 30 months from the date of the recent service;

documented evidence that the liferaft items of equipment have the date of expiry that is not earlier than the next periodic service at the recognized Servicing Station, or replacement of the items is possible without destroying the watertight integrity in accordance with the manufacturer's instructions during onboard inspections. Otherwise, term of the subsequent liferaft service at the recognized station shall be restricted by the following expiring validity period of the items of equipment;

entries in the inspection log-book verifying that the onboard inspections are carried out by trained and certified personnel within the interval not exceeding 12 months from the date of the recent service at the recognized Servicing Station, or from the date of the previous inspection, as appropriate, and monitoring of the humidity parameters inside and outside the liferaft watertight packaging as well as the gas leakage from the gas inflation system are performed with satisfactory results.

2.2 The results of the inspections specified in 2.1 shall be entered in the RS records issued during the relevant ship surveys (STORM system check list and/or Report (Form 6.3.10), whichever is applicable).

Российский морской регистр судоходства

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