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Sea-going vessels and marine technology — Instructions for planning, carrying out and reporting sea trials

Navires de haute mer et technologie marine — Instructions pour la planification, l'exécution et le compte rendu d'essais en mer

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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ISO 19019 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 300, *Sea-going vessels and marine technology*, in collaboration with Technical Committee ISO/TC 8, S*hips and marine technology*, Subcommittee SC 9, *General requirements*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Sea-going vessels and marine technology — Instructions for planning, carrying out and reporting sea trials

1 Scope

This International Standard provides ship owners, designers, shipbuilders and trial crew with basic instructions for the planning, carrying out and reporting of sea trials.

This International Standard provides general information for achieving a unified format for sea trials to be executed as identified in the contract.

This International Standard is applicable to sea trials generally adopted for types of mechanically propelled vessels as indicated in Annex B.

This International Standard is not applicable to submarines.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2923, *Acoustics — Measurement of noise on board vessels*

ISO 3046 (all parts), *Reciprocating internal combustion engines — Performance*

ISO 4867, *Code for the measurement and reporting of shipboard vibration data*

ISO 4868, *Code for the measurement and reporting of local vibration data of ship structures and equipment*

ISO 6954, *Mechanical vibration — Guidelines for the measurement, reporting and evaluation of vibration with regard to habitability on passenger and merchant ships*

ISO 15016, *Ships and marine technology — Guidelines for the assessment of speed and power performance by analysis of speed trial data*

DIN 81208-2, *Manoeuvring of ships — Part 2: Coasting stop trial*

DIN 81208-3, *Manoeuvring of ships — Part 3: Pull-out trial*

DIN 81208-4, *Manoeuvring of ships — Part 4: Acceleration trial*

DIN 81208-5, *Manoeuvring of ships — Part 5: Turning circle test/trial*

DIN 81208-6, *Manoeuvring of ships — Part 6: Accelerating turn test/trial*

DIN 81208-8, *Manoeuvring of ships — Part 8: Zig-zag test/trial (Z-test/trial)*

DIN 81208-10, *Manoeuvring of ships — Part 10: Reverse spiral test/trial (according to Bech)*

DIN 81208-11, *Manoeuvring of ships — Part 11: Direct spiral test/trial (according to Dieudonné)*

DIN 81208-12, *Manoeuvring of ships — Part 12: Stopping trial*

DIN 81208-13, *Manoeuvring of ships — Part 13: Traversing test/trial*

DIN 81208-23, *Manoeuvring of ships — Part 23: Turning test/trial with thrusters*

DIN 81208-24, *Manoeuvring of ships — Part 24: Course change test/trial*

DIN 81208-25, *Manoeuvring of ships — Part 25: Parallel track test/trial*

DIN 81208-26, *Manoeuvring of ships — Part 26: Man-overboard trial*

IMO Resolution A.468 (XII), Code on Noise Levels on Board Ships

International Convention for the Safety of Life at Sea (SOLAS), 1974

3 General information on sea trials

3.1 General

The aim of sea trials is to demonstrate that the vessel is in conformity with contract and with requirements of classification societies and flag authorities.

Sea trials are mainly functional, to demonstrate operation, behaviour, energy consumption and required power of the vessel, her systems, equipment and components. Sea trials shall be executed in a suitable area in order to avoid risks of collisions, damages and interruptions.

Sea trials are of two sorts:

a) global trials, which include propulsion trials, manoeuvring trials, structure vibration tests and noise level tests;

and

b) system trials, which include those non-global trials that cannot be done as quay trials, e.g. anchor-handling tests.

Only global trials and certain system trials are covered by this International Standard.

If necessary, the measured data should be recorded continuously, e.g. using a computer with a certain frequency of sampling (e.g. frequency of 1 Hz for speed trials). It is important to carry out an uncertainty analysis.

3.2 Responsibility for sea trials

The shipbuilder is responsible for planning, conducting and evaluating the sea trials.

Trials may be conducted by institutions acknowledged as competent to perform those trials, as agreed between the shipbuilder and the owner.

Instruments and equipment to be used on trials shall be calibrated and documented as traceable to international standards of measurement.

A trials report shall be prepared with necessary recorded data sheets, as well as all terms of acceptance, in accordance with Annex A.

The individual sheets of the trials report shall be signed by the participants, confirming that it correctly reports the trials results.

The trials report original shall remain in possession of the shipbuilder, and authentic copies shall be delivered to the owner and the Classification Society, as applicable.

3.3 Demonstration of operability

Some systems, such as ship propulsion and control systems, can be shown to operate in their design modes only at sea. This demonstration of operability verifies that

a) all systems are correctly connected,

b) the mode of operation and conduct of the systems agree with specifications,

c) there are no obstructions, leakage or other symptoms of malfunction.

3.4 Demonstration of performance and economy

During sea trials concerning the propulsion system, the aim is to confirm that the agreed power rating is attained and that the corresponding ship speed and propulsion engine output are those stipulated by the contract and correspond to speed and power of propulsion model tests, if available.

These trials shall be carried out in a specified reference load condition.

3.5 Demonstration of endurance

During endurance trials, the aim is to verify the ability of the system to operate in the specified mode for the time necessary to develop thermal equilibrium conditions and to allow detection of any inadequacies.

3.6 Applicability

For economic reasons and technical interest, it is convenient to analyse which trials should be performed on each type or series of ships (sister ships in series).

Lists of trials recommended for first-of-a-class that can be omitted for sister ships shall be specified in the contract.

Annex B presents Table B.3 which indicates in general the trials for different types of ship. In each case and taking into account specific conditions of each ship, those trials which are to be conducted shall be specifically defined in the contract.

4 Planning of sea trials

4.1 Actions required in preparing for sea trials

The shipbuilder responsible for sea trials shall carefully plan these trials, so they are carried out with the necessary safety measures in an accessible and adequate geographic area, in the strict minimum period of time and with unequivocal results accepted by all participants.

Planning shall assure that trials are carried out with respect to the following items.

a) All permits and certificates needed to go to sea have been obtained.

b) All needed insurance policies have been obtained.

c) All qualified personnel needed for operating the ship, and all engines, systems and equipment needed during the trials, have been ordered.

d) All regulatory bodies, Classification Society, ship owner, ship agents, suppliers, subcontractors, harbour facilities, departments delivering provisions, fuel, water, towing, etc., needed for conducting the sea trials, have been informed.

e) All safety measures have been checked and all fixed, portable and individual material (for crew, trial personnel and guests) is on board and operative.

f) Dock trials of all systems, as well as all tests of alarms, warning and safety systems, have been executed.

g) An inclining test has been performed, or at least a preliminary stability book has been approved, covering the sea trials condition, in accordance with 74 SOLAS Convention, as amended.

h) Provisional calibration of magnetic compass has been completed.

i) Calibration of the radio direction finder has been completed, if installed.

The actions indicated in h) and i) may be performed just before all other sea trials.

4.2 Sequence of sea trials

An example of sequence of sea trials is given in Annex C.

4.3 Safety precautions

Sea trials shall be held only after a careful check of all ship safety devices.

There shall be sufficient lifeboats and/or life-rafts and lifejackets for all personnel on board, their number and make shall be in accordance with the requirements of the Maritime Authority of the trial area.

All personnel on board shall be told what to do in case of abandoning ship, in particular how to use lifejackets.

A list of all personnel on board shall be communicated to the Maritime Authority of the trial area.

Everyone on board shall be assigned a station in case of fire alarm, flooding and abandoning ship; all these details shall be indicated in a provisional muster list.

All fire detection and fighting systems shall be installed and operative.

All bilge systems, fixed and portable, shall be installed, tested and operative.

All alarm, safety and warning devices shall be installed, tested and duly identified.

All external communication devices, both normal and emergency, and corresponding power feeders shall be installed, tested and operative.

All lifeboat and life-raft launching systems shall be installed, tested and operative.

Sea-trial crew shall be well aware of all safety devices and shall have specific instructions for acting in an emergency or abandonment, with special attention to assist all persons on board not belonging to the crew.

4.4 Trials which shall be completed before sea trials

Sea trials shall be executed after completion of all installations, builder's trials, dock tests and trials, in particular for the following:

- main engines and all their command, control, alarm, safety and warning devices;
- electric generators, including emergency generator, and their command, control, alarm, safety and warning devices;
- steering gear and its emergency and alarm devices;
- navigation and signal light systems;
- whistle;
- signalling lamps;
- power, lighting and emergency electric installations;
- normal and emergency radio external communications;
- magnetic compass;
- flags, shapes, pyrotechnics and cable gear for seesaw;
- gyrocompass, radar, radio direction finder and depth sounding device and navigation platform (if installed);
- compressed air system (if installed);
- internal telephone network, voice pipes and intercommunicators (as appropriate);
- winches and capstans;
- anchors and chains.

The use of a previously fixed check list is recommended, including all systems and equipment that are required to be installed and tested before sea trials.

4.5 Pre-trial meeting

Before commencing sea trials, the following matters shall be addressed and agreed upon and, if considered necessary, shall be discussed in a pre-trial meeting:

a) objectives to be attained by executing sea trials;

b) execution details;

c) selection, approval, installation and definition of calibration standards of measurement equipment and instruments;

d) partition of responsibilities and execution of operational and control tasks of trials;

e) programme, area, duration and timetable of trials;

f) conditions and operating methods during trials;

g) correction methods to be used due to differences between specified conditions and conditions during execution;

h) acknowledgement and approval of records procedures.

4.6 Final meeting

A final meeting involving the owner, the shipbuilder and all concerned authorities, shall be held after sea trials are completed, in order to finalise the acceptance protocol.

5 Propulsion trials

5.1 Speed trial

5.1.1 Purpose

A speed trial is held to verify fulfilment of contractual obligations regarding ship speed and shaft power at certain draughts (preferably related to ship model test draughts). The relationship between ship speed, shaft power, shaft revolutions per minute and/or propeller pitch settings for controllable-pitch propellers should take the form of plots or tables.

5.1.2 Trial specification

Whenever possible, execution and analysis shall be in accordance with ISO 15016.

If no specific conditions are invoked by the contract, speed trials shall be conducted with propulsion engines delivering normal continuous power, and at other speed points corresponding to lower powers which are intended to be used in future operation of the ship, and which may be used to work out shaft rotational speed tables and/or propeller pitch settings, as appropriate. Reduced loading of the propeller shall be taken into account.

When an overload trial of main engines has not been held during factory acceptance tests, it may be held during this trial if the requested technical conditions are met. Reduced loading of the propeller shall be taken into account.

Corrections on main engine performance due to differences between trial conditions and contract reference conditions shall be established in accordance with ISO 3046 (all parts).

During speed trials, any propulsion engine power take-off for auxiliaries which are not part of the propulsion system shall be clearly identified.

For propulsion engines with maximum continuous power above 2 000 kW, a torsion meter is recommended for measuring power output.

5.1.3 Restrictions to the execution of the trial

Whenever possible, water depth in the trial area shall be in accordance with ISO 15016.

Whenever possible, conditions of wind and sea state shall be in accordance with ISO 15016.

5.1.4 Instrumentation required for the trial

The following instruments are needed in particular for this trial:

a) torsion meter, duly calibrated and zero setting checked before and after test (if propulsion system power $\geqslant$ 2 000 kW);

b) stop watches;

c) tachometer;

d) electronic positioning system (DGPS, GPS, trisponder or equivalent);

e) anemometer.

5.1.5 Trial execution

The following provisions shall be respected.

a) Speed trials shall be executed in an area with sufficient depth of water. In the case of limited water depth, depth changes in the trial area shall be avoided.

b) A well-defined length and trajectory of the runs for the trial shall be established. Double runs should preferably be made with head and tail winds.

c) The chosen runs shall not cross navigation routes or active fishing grounds.

d) The length of the runs established by location of land markers shall be between half a mile (for small craft only) and two miles. Reference bearings should preferably be defined by parallel alignments, themselves perpendicular to the defined runs.

e) The length of the runs established by electronic positioning systems shall preferably be equivalent to between 5 min and 10 min measuring time or to between 1 mile and 2 miles measuring distance, the measuring point of all double runs being the same as far as possible and the chosen measurement system having a precision deviance of less than 20 m.

f) Since in case e) the course of the runs is more flexible, a course shall be chosen such that wind effects are less important. Beam-relative wind is not recommended, because this could cause yawing and pronounced rolling. As discussed in b) above, head and tail winds are preferable.

g) Independently of the speed to be verified by contractual obligation, the number of runs executed shall be in accordance with ISO 15016.

h) For ships fitted with controllable-pitch propellers, speed trial(s) may normally be executed for more than one propeller-pitch setting.

i) Each chosen speed condition shall correspond to normal ship operating conditions; in the case of ships with more than one shaft, a speed condition corresponding to only one driven shaft may be chosen in addition.

j) Shaft rotational speed should be obtained from readings of the revolution counter at the beginning and at the end of each run.

k) The approach run to the measured course shall be long enough to give steady conditions of course, shaft rotational speed and ship speed before commencing measurements.

l) As far as practicable, speed trials should be performed at displacement and draught conditions which are comparable to those of a model test, provided such test results are available.

5.1.6 Data to be monitored and recorded

During the trial, the following data shall be monitored and recorded:

— area of trial;

— date, time and duration of trial, for each run;

— mean water depth in area of trial, for each run;

— sea conditions, for each run;

— wind conditions, for each run;

— draught forward, amidships and aft;

— displacement;

— current conditions (optional), for each run;

— heading, for each run;

— rudder angle, for each run;

— shaft torque (when specified), for each run;

— shaft power (when specified), for each run;

— propeller(s) rotational speed, for each run;

— propeller(s) pitch (controllable-pitch propeller), for each run;

— speed over the ground, for each run;

— speed through the water (mean of reverse runs), for each run;

— time elapsed since last hull cleaning;

— hull surface condition;

— sea water temperature and density (in the case of deep-draught ships, it should be measured at two depths, i.e. at the water surface and at the cooling water inlet, and the mean value taken);

— operating data for propulsion engines, including fuel temperature.

5.1.7 Reporting of data

Trial data shall be reported on data forms such as the tables of ISO 15016.

5.2 Fuel consumption trial

5.2.1 Purpose

If stipulated in the contract, a fuel consumption trial shall be held to verify fulfilment of specified fuel consumption corresponding to delivered power at specified loading conditions.

The relation between fuel consumption and shaft power or shaft rotational speed/propeller pitch settings, respectively, shall take the form of plots or tables.

5.2.2 Trial specification

If no specific conditions are invoked in the contract, the fuel consumption trial shall be conducted with propulsion engines delivering normal continuous rating.

5.2.3 Restrictions to the execution of the trial

These restrictions are identical to those given in 5.1.3.

5.2.4 Instrumentation required for the trial

The following instruments are needed in particular for this trial:

a) torsion meter (optional), duly calibrated and the zero setting checked before and after the test;

b) fuel meters, duly calibrated;

c) stop watches;

d) tachometer;

e) anemometer.

5.2.5 Trial execution

The following provisions shall be respected.

a) The fuel consumption trial shall be executed in an area with sufficient depth of water. The chosen run shall not cross navigation routes or active fishing grounds.

b) Two samples of the fuel shall be taken before the sea trial, at the fuel oil service pump discharge or at an equivalent station. These samples shall be duly sealed and one shall be analysed in advance of the sea trial.

c) The status of auxiliaries shall be clearly defined.

5.2.6 Data to be monitored and recorded

The data indicated in 5.1.6 shall be monitored and recorded, with the addition of fuel consumption data.

5.2.7 Reporting of data

Trial data shall be reported on data forms such as Annexes D and E.

5.3 Endurance trial

5.3.1 Purpose

Endurance trials are held to demonstrate that the main propulsion system and its auxiliaries are able to function well at specified conditions of agreed continuous power for a prescribed period, sufficient to develop equilibrium conditions and reveal inadequacies, if any, of the system including its auxiliaries.

5.3.2 Trial specification

If no specific conditions are invoked by the contract or the Classification Society, the endurance trial should be conducted with main propulsion engines operating at agreed power output, at the specified load and for a period of 4 h.

5.3.3 Restrictions to the execution of the trial

Restrictions to the execution of the trial may be

a) disturbance, due to marine traffic or inadequate environmental conditions, which causes inconsistent immersion of the propeller(s), or

b) seakeeping, which is critical for the safety of the vessel.

5.3.4 Instrumentation required for the trial

All instruments needed to read and record data mentioned in 5.3.6 are required.

5.3.5 Trial execution

Before the start of the measurements, proper operation and status of relevant auxiliaries and fuel meter(s) shall be checked; existing by-passes shall be closed.

5.3.6 Data to be monitored and recorded

During the trial, particular attention shall be given to the temperature and pressure equilibrium of main propulsion engines and their auxiliary engines. Relevant data shall be recorded.

The system and auxiliaries shall be carefully observed for potential leakage, heating, vibrations and abnormal noises. Relevant data shall be recorded.

The behaviour and equilibrium of automatic regulating and control systems shall be verified.

5.3.7 Reporting of data

Trial data shall be reported on data forms such as Annex D.

5.4 Astern trial

5.4.1 Purpose

An astern trial is held to demonstrate that the main propulsion system is able to function well at specified conditions of permissible astern power for an adequate period, sufficient to develop steady conditions and reveal any inadequacies or anomalies in the system.

5.4.2 Trial specification

If no conditions are specified, the astern trial shall be conducted with the main propulsion engines delivering permissible astern power, at the specified load.

5.4.3 Restrictions to the execution of the trial

Restrictions to the execution of the trial may be the environment conditions critical for the safety of the vessel.

5.4.4 Instrumentation required for the trial

All instruments needed to read and record data mentioned in 5.4.6 are required.

5.4.5 Trial execution

The difficulty of the astern trial is to keep a constant load on the propeller despite draught variations provoked by pitching and by waves.

As astern steering is difficult, the trial shall be held at an approximately constant heading which shall be chosen with respect to a favourable direction to wind and seaway. This depends on the above-water profile of the vessel.

Recommended heading conditions: either superstructure all aft (head wind) or superstructure all forward (tail wind).

5.4.6 Data to be monitored and recorded

During the trial, particular attention shall be given to reduction gear (if installed), thrust block and forward stuffing box of the stern tube. In particular, any heating, abnormal vibrations and noises shall be recorded.

5.4.7 Reporting of data

Trial data shall be reported on data forms such as Annex D.

6 Control system trials

6.1 Steering gear trials

6.1.1 Purpose

Steering gear trials are performed to verify the performance of the steering gear and to demonstrate its efficiency.

6.1.2 Trials specification

If the loading condition is not contractually specified, steering gear trials shall be conducted at a displacement as close as reasonably possible to full-load displacement for merchant ships and warships.

Speeds shall be full ahead and, if specified, full astern, respectively.

NOTE The full-astern steering gear trial is in general not applicable to merchant ships.

6.1.3 Restrictions to the execution of the trials

Steering gear trials shall be executed in an area of little traffic that allows the trials to be performed without interruption and risk of collision or causing material damage as can occur in e.g. traditional fishing grounds with submerged nets, hook lines, etc.

6.1.4 Instrumentation required for the trials

All instruments needed to read and record data listed in 6.1.6 are required.

6.1.5 Execution of the trials

6.1.5.1 Ahead-steering-gear trial

With the main propulsion engines delivering maximum continuous rating ahead or at the corresponding shaft speed, the following rudder manoeuvres shall be executed. The first direction of rudder movement, i.e. port or starboard, shall be at the discretion of the trial captain, considering the conditions in the area. The following description is for first rudder deflection to port.

a) Amidships to 35° port — Hold for sufficient duration in order to record time taken, at the steering gear, between rudder amidships and 30°;

b) 35° port to 35° starboard — Hold approximately 10 s; record time taken, at the steering gear, between 35° hardover to 30° to the opposite side (as the steering gear is slowing down between 30° and hardover);

c) 35° starboard to 35° port — Hold approximately 10 s; record time taken between 35° starboard and 30° port;

d) 35° port to amidships — Record time taken between 35° port and rudder amidships;

e) trial completed.

This trial shall be repeated for each power unit of the steering gear and, if possible, for both units acting together. For emergency power units, trials shall be performed at reduced speed and reduced rudder angles.

Setting of the propulsion plant of a single-screw main propulsion system shall not be changed during the trial; however, change in throttle adjustment or propeller pitch in the case of a controllable-pitch propeller plant or multi-screw main propulsion systems is permissible during the trial to avoid overload or overspeed.

If the maximum rudder angle is less than 35°, the maximum possible rudder angle shall be used, with time determined to the maximum angle minus 5°, as above.

6.1.5.2 Astern-steering-gear trial

With the ship moving astern and main engines delivering maximum permissible astern power or the ship at maximum permissible astern speed, the following rudder manoeuvres shall be executed:

a) Amidships to δ° port (the maximum astern rudder angle δ° chosen depends on the type and size of vessel: for vessels with length of more than 80 m, δ = 15° is proposed) — Hold for sufficient duration in order to record the time taken at the steering gear;

b) δ° port to δ°starboard — Hold approximately 10 s;

c) δ° starboard to δ° port — Hold approximately 10 s;

d) δ° port to rudder amidships;

e) trial completed.

Procedures concerning power units of the steering gear are to be analogous to those described under the ahead steering gear trial (6.1.5.1).

6.1.6 Data to be monitored and recorded

6.1.6.1 Ahead-steering-gear trial

The following data shall be recorded:

a) steering gear power unit in use;

b) variations in fuel throttle setting;

c) rudder angle;

d) time required for each rudder movement;

e) maximum oil pressure on steering gear ram;

f) oil pressures on steering gear system, if manometers have been installed;

g) operation data of electric motors acting on steering gear oil pumps, either in idle or maximum power;

h) weather, wind velocity and direction, and sea condition;

i) ship speed at the start of first rudder movement;

j) propeller speed at the start of first rudder movement.

6.1.6.2 Astern-steering-gear trial

The data listed in 6.1.6.1 shall be reported.

6.1.7 Reporting of data

Trials data shall be reported on data forms such as Annex F.

6.2 Thrusters trials

6.2.1 Purpose

Thrusters trials are held to verify correct operation of the system and to demonstrate that its characteristics satisfy the contract.

Results of these trials are important in providing information for IMO Resolution A.601 (15).

6.2.2 Trials specification

In addition to verifying functionality of the system, the trials are held to measure consumption (when electrically driven) or operating pressures and eventually flows (when hydraulically driven), with the thrusters running at the load conditions specified by the contract.

It is recommended that vibration and noise levels created by thrusters be measured during the trials and compared with specified values, if defined.

6.2.3 Restrictions to the execution of the trials

Thrusters trials should preferably be executed in calm wind and sea conditions, not exceeding Beaufort 3 to 4, Sea State 2 to 3.

6.2.4 Instrumentation required for the trials

Electronic positioning equipment (trisponder, GPS or equivalent) is required.

6.2.5 Trials execution

The following trial manoeuvres shall be carried out:

a) bow thruster

Turning trial: with the ship dead-in-water and heading into the wind, the bow thruster shall operate at full thrust for the time it takes to turn 90° to one side and back to the initial position; operation shall be repeated to the other side.

b) rudder thruster (active rudder)

1) moving ahead: with main propulsion system stopped, thruster shall operate with rudder amidships; this trial shall last about 10 min for each of the following conditions: half thruster power and full thruster power;

2) steering trial: identical to bow thruster trial, with a rudder thruster angle of 20° to each side.

c) other thruster types

To be specified according to purpose of the ship in question.

6.2.6 Data to be monitored and recorded

The following data shall be recorded:

a) bow and stern thrusters

Turning trial: Time needed for executing 90° turns in either direction, and power unit operation data, shall be measured and recorded.

b) rudder thruster (active rudder)

1) ship's true track and attained speed shall be measured and recorded;

2) recordings identical to those indicated for bow thruster steering trial shall be carried out.

c) other thruster types

To be defined according to their type.

6.2.7 Reporting of data

Trials data shall be reported in data forms such as Annex G.

6.3 Fin stabilizers trial

6.3.1 Purpose

The fin stabilizers trial is held to verify correct operation of the fin unit(s) from the individual stabilizer compartment(s) and to demonstrate the stabilizer(s)' performance and ship-stabilizing ability from the ship bridge control panel.

6.3.2 Trial specification

In addition to verifying functionality of the system by performing local control operation trials, which include such trials as housing and extension of the fin(s), fin(s) tilting and emergency housing of the fin(s), the sea trials are held to demonstrate the power of the fins and to provide a comparison between the ship's natural righting motion and the stabilized righting motion.

6.3.3 Restrictions to the execution of the trial

Any restrictions shall be agreed between shipbuilder and owner.

6.3.4 Instrumentation required for the trial

The following instrumentation is required:

a) stop watches;

b) all instruments needed to read and record data as required in 6.3.6.

6.3.5 Trial execution

6.3.5.1 Local control operation trials

The following trial manoeuvres shall be carried out:

a) housing and extension trial

With the ship at maximum speed, extend and house the fin(s) from the local control unit, and record the time taken, maximum pressure and maximum motor current during the extension and housing sequences.

b) fin(s) tilting trial

With the ship at the fin(s) design speed, activate the local control unit hard over test to tilt the fin(s), and record nose-up and nose-down hard-over times, maximum nose-up and nose-down pressures and maximum nose-up and nose-down motor currents.

c) emergency housing trial

With the ship sailing at a specified speed of e.g. 10 knots, and the fin(s) extended, use the emergency motor and the manually operated tilt and house valves to centre and house the fin(s), and record the time taken and the maximum pressure for the housing sequence.

6.3.5.2 Sea trial modes

The control system normally provides automatic set-up and demonstration modes during sea trials. These modes employ the fins to roll the ship. The roll angle is limited to approximately 10° to either side. At the end of a successful set-up or demonstration, the control system reverts to stabilizing the roll motion of the ship.

a) Forced-roll demonstration

This trial demonstrates the power of the fins and provides a comparison between the ship's natural righting motion and the stabilized righting motion. The control system force-rolls the ship at the ship's natural period, with a fin angle which generates a ship roll angle of 10° on each side. The rolling continues for six periods to allow the roll motion to build up. The fins are then centred for six periods to allow the motion to decay. The fins roll the ship a second time for six periods before switching over to stabilizing. A bridge control panel audible alarm gives an audible warning at the start of each sequence of the two force-rolls.

b) Automatic housing

When reducing the ship speed gradually with the fins out, the fins should automatically house at a low speed.

6.3.6 Data to be monitored and recorded

The following data shall be recorded:

a) time to extend and house fin(s);

b) maximum hydraulic pressures;

c) maximum motor currents;

d) roll amplitudes.

6.3.7 Reporting of data

Trial data shall be reported on data forms such as Annex H.

7 Manoeuvring trials

7.1 Purpose

Manoeuvring trials serve to verify contractually specified manoeuvring performance and to measure manoeuvring qualities of the ship as a reaction to rudder and engine actions.

Results of these trials are fundamental in providing information for IMO Resolutions A.601 (15) and A.751 (18), as amended.

7.2 Trials specification

Manoeuvring trials shall be conducted in a reference load condition which should be typical for the ship in question:

a) full load displacement for warships;

b) ballast or full load displacement for merchant ships.

The load condition to execute manoeuvring trials shall be agreed upon between the owner and the shipbuilder.

Except where differently specified, manoeuvring trials are started with an approach speed of at least 90 % of the ship speed corresponding to 85 % of the maximum engine output.

Manoeuvring trials may be selected from those described in 7.5.1 to 7.5.14.

A minimum programme of manoeuvring trials should include the trials necessary to provide the information for IMO Resolution A.751 (18), i.e.:

— turning-circle trials (with maximum rudder angle to both sides);

— zig-zag trials (10°/10° and 20°/20°);

— stopping trial.

7.3 Restrictions to the execution of the trials

Manoeuvring trials shall be executed in an area of little traffic that allows specified manoeuvres to be executed without interruption.

7.4 Instrumentation required for the trials

To execute these trials in accordance with the contract, precision electronic positioning equipment is needed, e.g. a trisponder or GPS. When it is not possible to use an electronic positioning system, other procedures for measuring distance and position may be applied based on regular time intervals.

7.5 Trials execution

7.5.1 Coasting stop trial

The coasting stop trial is a natural speed-extinction trial that serves to determine ship's behaviour after the propulsion plant has been disengaged and/or shut down. The trial shall be conducted in accordance with DIN 81208-2.

7.5.2 Pull-out trial

The pull-out trial is a yaw checking trial that provides a rapid determination of ship's yaw stability. The trial shall be conducted in accordance with DIN 81208-3.

7.5.3 Acceleration trial

The acceleration trial serves to determine the acceleration performance. The trial shall be conducted in accordance with DIN 81208-4.

7.5.4 Turning-circle trial

The turning-circle trial serves to determine ship's behaviour during the period of transient motion and the ensuing steady turn after the rudder(s) have been put over. The trial shall be conducted in accordance with DIN 81208-5.

7.5.5 Accelerating-turn trial

The accelerating-turn trial serves to determine ship's behaviour when accelerating with half-ahead power from stand-still and simultaneously putting the rudder hard over. The trial shall be conducted in accordance with DIN 81208-6.

7.5.6 Zig-zag trial

The zig-zag trial serves to determine ship's turning and yaw checking ability. The zig-zag trial also provides information on the steering ability. The trial shall be conducted in accordance with DIN 81208-8.

7.5.7 Reverse-spiral trial (according to Bech)

The reverse-spiral trial serves to determine ship's yaw stability by measuring average rudder angles for given yaw rates. This trial is an alternative to the direct-spiral trial (7.5.8). The trial shall be conducted in accordance with DIN 81208-10.

7.5.8 Direct-spiral trial (according to Dieudonné)

The direct-spiral trial serves to determine ship's yaw stability by measuring average yaw rates for a given sequence of rudder angles. This trial is an alternative to the reverse-spiral trial (7.5.7). The trial shall be conducted in accordance with DIN 81208-11.

7.5.9 Stopping trial

The stopping trial is a forced speed-extinction trial that serves to determine ship's reaction after active reversal of the thrust direction of the propulsion plant. The trial shall be conducted in accordance with DIN 81208-12.

7.5.10 Parallel course trial

The parallel course trial serves to generate information on the heading change after which counter-rudder is to be applied in order to swing into a parallel course of given separation. The trial shall be conducted in accordance with DIN 81208-25.

7.5.11 Traversing trial

The traversing trial serves to determine ship's capability to execute a lateral movement, if possible without moving in a longitudinal direction. The trial shall be conducted in accordance with DIN 81208-13.

This trial should only be executed when it is possible to guarantee safe conditions.

NOTE This trial is usually not applicable to merchant ships.

7.5.12 Turning trial with thrusters

The turning trial with thrusters serves to determine ship's capability to turn at zero speed by using its thrusters. It serves also to determine the limiting ahead speed at which no turning effect from the bow thrusters can be recognised. The trial shall be conducted in accordance with DIN 81208-23.

7.5.13 Man-overboard trial

The man-overboard trial may be conducted in the form of the Williamson-turn or the Scharnow-turn. The trials serve to generate data on how to perform a man-overboard manoeuvre. This trial shall be conducted in accordance with DIN 81208-26.

7.5.14 Course-change trial

The course-change trial serves to determine the time or path after which counter-rudder is to be ordered to swing into a given new heading. The trial shall be conducted in accordance with DIN 81208-24.

7.6 Data to be monitored and recorded

Data shall be monitored and recorded in accordance with Annex I.

7.7 Reporting of data

Trial data shall be reported on data forms such as Annex J.

8 Miscellaneous tests

8.1 Anchor-handling test

8.1.1 Purpose

The anchor-handling test is carried out to verify the function of the system, in particular to verify the actual power of the winch(es) or capstan(s), their control and their braking devices with respect to lowering and hoisting the anchor(s).

8.1.2 Test specification

The anchor-handling test consists of the following manoeuvres:

— lowering the anchor;

— dropping the anchor;

— hoisting the anchor;

— lifting the chain;

— stowing the anchor.

Mechanical and electromagnetic braking, chain stowage in the chain locker, stowage and securing of anchor, and finally releasing the chain from the fastening shackle, shall be verified during the test.

8.1.3 Restrictions to the execution of the test

The test shall be executed in a suitable anchorage area, in accordance with good maritime practice.

8.1.4 Instrumentation required for the test

The following instrumentation is required:

a) stop watch;

b) amperemeter and voltmeter, duly calibrated;

c) pressure gauges (for hydraulic or steam-powered winches).

8.1.5 Test execution

The procedure to be followed shall be agreed upon between the surveyor of the Classification Society and the shipyard.

For every anchor, including stream anchor, execute as follows.

a) Test the system for release of the chain from its fastening shackle.

b) Lower the anchor from the hawse pipe.

c) Let go the anchor and verify the efficiency of manual brake, considering capacity and safety limitations.

d) With the ship anchored and the chain under stress, verify brake action in compliance with manufacturer's specifications.

e) Lift the chain, measuring time needed for hoisting each length, and calculate the mean hoisting speed of the winch or capstan.

f) During hoisting, measure electrical data.

g) Verify housing condition of chain and anchor and efficiency of anchor-securing device.

h) Verify efficiency of washing chain and anchor.

8.1.6 Data to be monitored and recorded

During the test the following data shall be monitored and recorded:

— area of test;

— date, time and duration of test;

— water depth and type of bottom;

— sea condition;

— current conditions;

— wind conditions;

— draught forward and aft;

— displacement;

— characteristics of the anchoring system;

— time needed for hoisting each length;

— calculation of hoisting speed of the system;

— electrical operation and oil pressure data (if applicable).

8.1.7 Reporting of data

Test data shall be reported on data forms such as Annex K.

8.2 Structure vibration tests

8.2.1 Purpose

Vibration tests are performed to demonstrate that the vibration pattern of hull, superstructure, main propulsion system and other systems of prime concern is within standardised acceptance limits valid for structure, equipment or personnel.

8.2.2 Test specification

Vibration tests shall be conducted in accordance with ISO 4867, and the evaluation of vibration pattern shall be carried in accordance with ISO 6954.

As some transducer locations indicated in ISO 4867 are optional, vibration measurements shall be taken at those locations only if specifically indicated in the contract.

8.2.3 Restrictions to the execution of the test

Any test restrictions shall be in accordance with ISO 4867.

8.2.4 Instrumentation required for the test

Instrumentation for the test shall be in accordance with ISO 4867.

8.2.5 Test execution

The test shall be executed in accordance with ISO 4867.

If measurements of structure vibrations shall be executed in locations where subjectively abnormal vibrations are observed, or expected to occur, they shall be conducted in accordance with ISO 4868.

8.2.6 Data to be monitored and recorded

Data shall be monitored and recorded in accordance with ISO 4867 and ISO 4868.

8.2.7 Reporting of data

Test data shall be reported in data forms such as tables as shown in ISO 4867 and ISO 4868.

8.3 Noise level test

8.3.1 Purpose

The airborne noise level test is performed to assess noise level within living spaces and other temporarily or permanently manned spaces, to characterise the acoustic comfort of the ship and allow comparison with acceptance criteria or reference noise levels. Measurements may also allow the verification of noise levels estimated in advance, and help in the study of actions to reduce noise.

8.3.2 Test specification

The noise level test shall be conducted in accordance with ISO 2923. The results shall satisfy in particular IMO Resolution A.468(XII) or equivalent requirements.

8.3.3 Restrictions to the execution of the test

Any test restrictions shall be in accordance with ISO 2923.

8.3.4 Instrumentation required for the test

Instrumentation for the test shall be in accordance with ISO 2923.

8.3.5 Test execution

The test shall be executed in accordance with ISO 2923.

This test may be combined with an endurance trial.

8.3.6 Data to be monitored and recorded

The test data shall be monitored and recorded in accordance with ISO 2923.

8.3.7 Reporting of data

Test data shall be reported on data forms such as given in Annex L, Tables L.1 and L.2.

Annex A
(normative)

Trial acceptance document

Shipbuilder: Name of ship:	Owner:
Registration data	

Trial_____

Place:_____

Trial date:_____

The _____ has been subjected to the trial indicated above,

and complies with performance requirements.

The following restrictions apply: _____

_____

_____

For the owner (signature)_____

For the shipbuilder (signature)_____

For_____

For_____

Annex B
(normative)

Sea trials

Table B.1 — Individual sea trials

Reference to trial	Trial name
5.1	Speed trial
5.2	Fuel consumption trial
5.3	Endurance trial
5.4	Astern trial
6.1.5.1	Ahead-steering-gear trial
6.1.5.2	Astern-steering-gear trial
6.2	Thruster trials
6.3	Fin stabilizer trials
7.5.1	Coasting-stop trial
7.5.2	Pull-out trial
7.5.3	Acceleration trial
7.5.4	Turning-circle trial
7.5.5	Accelerating-turn trial
7.5.6	Zig-zag trial
7.5.7	Reverse-spiral trial
7.5.8	Direct-spiral trial
7.5.9	Stopping trial
7.5.10	Parallel course trial
7.5.11	Traversing trial
7.5.12	Turning trial with thrusters
7.5.13	Man-overboard trial
7.5.14	Course change trial
8.1	Anchor handling test
8.2	Structure vibration tests
8.3	Noise level test

Table B.2 — Ship type reference

Reference	Ship type
A	Cargo ships under 4 000 gross tonnage
B	Cargo ships over 4 000 gross tonnage
C	Passenger ships
D	Warships and other naval ships
E	Fishing boats and ships
F	Local traffic boats
G	Port and river passenger boats
H	Tugboats

Table B.3 — Trial applicability

Trials [a]	Ship type [b]								Comment
	A	B	C	D	E	F	G	H	
5.1	Y	Y	X	X	Y	Y	Y	Y	[c]
5.2	Y	X	X	Y	Y	Y	Y	Y	[c]
5.3	X	X	X	X	X	X	X	X	
5.4				X	X	X	X	X	
6.1.5.1	X	X	X	X	X	X	X	X	
6.1.5.2				X			X	X	
6.2	X	X	X	X	X	X	X	X	[d]
6.3	X	X	X	X	X	X	X	X	[d]
7.5.1	Y	Y	Y	Y					
7.5.2	Y	Y	Y	Y	Y		Y	Y	
7.5.3	Y	Y	Y	Y	Y		Y	Y	
7.5.4	Y	Y	Y	Y	Y		Y	Y	
7.5.5	Y	Y	Y	Y	Y		Y	Y	
7.5.6	Y	Y	Y	Y	Y		Y	Y	
7.5.7 7.5.8	Y	Y	Y	Y	Y		Y	Y	
7.5.9	Y	Y	X	X	Y		X	Y	
7.5.10	Y	Y	Y	Y	Y		Y	Y	
7.5.11			Y	Y	Y		Y	Y	[e]
7.5.12	Y	Y	Y	Y	Y		Y	Y	[d]
7.5.13	Y	Y	Y	Y	Y		Y	Y	
7.5.14	Y	Y	Y	Y	Y		Y	Y	
8.1	X	X	X	X	X	X	X	X	
8.2	Y	Y	Y	Y	Y		Y	Y	
8.3	Y	Y	X	X	Y		X	Y	

X execution of this trial recommended for all boats and ships.

Y execution of this trial recommended for first-of-a-class.

[a] For trial name, see Table B.1.

[b] For ship type, see Table B.2.

[c] Use of a torsion meter is recommended for propulsion system engines where maximum continuous power is equal to or greater than 2 000 kW.

[d] When thrusters or fin stabilizers are installed.

[e] When the ship has traversing capability.

Annex C
(normative)

Normal sequence of sea trials

The sequence of sea trials shall be previously established and submitted to the agreement of all concerned participants. The availability or convenience of a geographical area for holding the trials can influence the sequence of the trials.

A normal sequence of sea trials might be as follows:

— preliminary activities and calibration of equipment;

— speed and fuel consumption trials;

— steering gear trials;

— manoeuvring trials;

— endurance trial;

— astern trial;

— noise level test;

— structure vibration tests;

— thrusters test and fin stabilisers trial;

— anchor handling test.

NOTE 1 Some parts of structure vibration tests can be executed during speed and fuel consumption trials and stopping trials.

NOTE 2 Calibration of the ship log can be carried out during speed and fuel consumption trials.

NOTE 3 Some parts of structure vibration tests and noise level tests can be executed during an endurance trial.

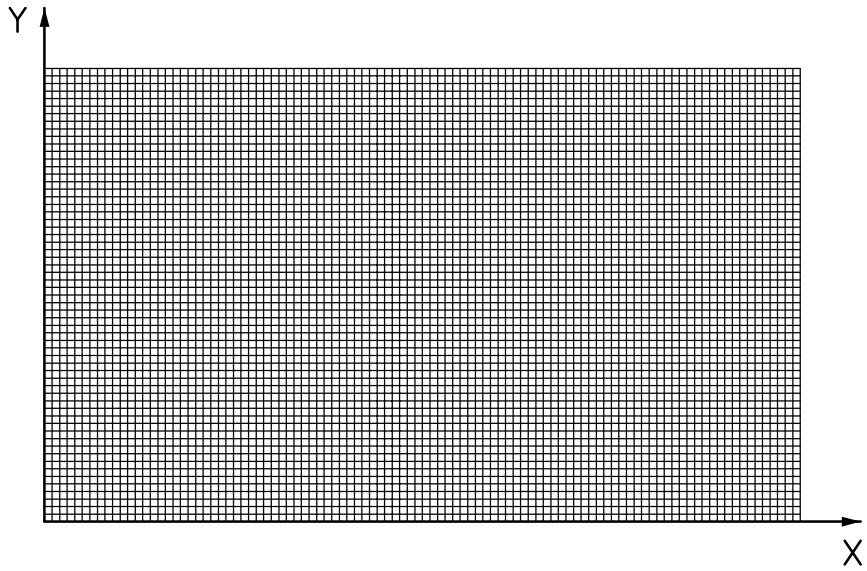
Annex D
(informative)

Sea trials — Propulsion plant data sheet

Name of ship:			Shaft:				Date:			
Time										
Propeller speed (r/min)		pitch								
Power		kW								
Engine room ambient.temperature		°C								
Air pressure near engine intake		kPa								
Sea water temperature		°C								
Fuel consumption		kg/h								
Lubricating oil	Pressure	Inlet filter								
		Outlet filter								
	Temperature	Inlet eng.								
		Outlet eng.								
Cooling water	Pressure	Inlet pump								
		Outlet pump								
	Temperature	Inlet eng.								
		Outlet eng.								
Air supercharge	Pressure	Inlet supercharge								
		Outlet supercharge								
	Temperature	Inlet supercharge								
		Outlet supercharge								
Supercharger speed										
Temperature of exhaust gases		Cyl. No. 1								
		Cyl. No. 2								
		Cyl. No. 3								
		Cyl. No. 4								
		Cyl. No. 5								
		Cyl. No. 6								
Sea water	Pressure	Inlet pump								
		Outlet pump								
	Temperature	Inlet cooler								
		Outlet cooler								
Reduction gear	Lubricating oil	Pressure								
		Temperature								
	Cooling water	Pressure								
		Temperature								
Comments:										
Fuel: □ Lubricating oil: □			For the owner: For the shipbuilder: For: For:							

Annex E
(informative)

Speed and economy trials



Key

X revolutions per minute

Y effective consumption, g/kW/h

Figure E.1 — Fuel consumption curve

Name of ship: Owner:	Shipbuilder:
Place: Date: Time:	Person in charge of trial:
Propulsion system characteristics:	
Ship's characteristics: Length between perpendiculars =	Light displacement: Trial displacement:
Beam = Depth =	Draught forward: Draught aft:
Sea water temperature:	Ambient temperature:
Fuel characteristics: Specification: Origin: Lower calorific power:	Temperature: Density:

Annex F
(informative)

Steering gear trials

Data sheet of trial_____

Name of ship: Owner:	Shipbuilder:
Place: Date: Time:	Person in charge of trial:
Radio position system:	Displacement:
Mean water depth:	
Wind: Sea:	Draught forward: Draught aft:
Initial course:	Propeller r/min:
Type of rudder:	Max. rudder angle:
Time hard-over to hard-over – 1 power unit: Time hard-over to hard-over – 2 power units:	Min. speed to maintain course (propeller stopped): Rudder angle for neutral effect:

Pump	Rudder angle	Time delay	Oil pressure	Elec. motor A	Ship speed	Comments
No. 1	—					
	—					
	—					
	—					
No. 2	—					
	—					
	—					
	—					
No. 1 + No. 2	—					
	—					
	—					
	—					

Annex G
(informative)

Data sheet for thrusters test

<table>
<tr><td colspan="2">Name of ship:

Owner:</td><td>Shipbuilder:</td></tr>
<tr><td colspan="2">Place:

Date:

Time:</td><td>Person in charge of test:</td></tr>
<tr><td colspan="3">Propulsion system characteristics:</td></tr>
<tr><td>Tests:</td><td></td><td rowspan="4">Radio position equipment:

Characteristics/calibration:

Institution:

Performer:</td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td colspan="3">Report/Comments:</td></tr>
</table>

Annex H
(informative)

Data sheet for stabilizer sea trials

Ship: Name ..... Owner .....
Type ..... Builder .....
Displacement mass ..... Metacentric height .....
Trial: Location ..... Date .....
Wave height ..... Wave direction .....
Wind speed ..... Wind direction .....

Extend/House trial	Port		Starboard	
Ship's speed = …… Knots	Extend	House	Extend	House
Time				
Max. hydraulic pressure				
Max. motor current (A)				
Fin tilting trial	Port fin unit		Starboard fin unit	
Ship's speed = …… Knots	Nose up	Nose down	Nose up	Nose down
Time				
Max. hydraulic pressure				
Max. motor current (A)				

Emergency housing Ship's speed = …… Knots	Port	Starboard
Time		
Max. hydraulic pressure		

Natural righting motion (fins centred)	1st period after fins are centred	2nd period after fins are centred	3rd period after fins are centred	4th period after fins are centred	5th period after fins are centred	6th period after fins are centred
Roll amplitude at beginning of nth period						
Roll amplitude after half period						
Fin-damped righting motion	1st period with fins activated	2nd period with fins activated	3rd period with fins activated	4th period with fins activated	5th period with fins activated	6th period with fins activated
Roll amplitude at beginning of nth period						
Roll amplitude after half period						

Date: .....
Yard: ..... Owner: .....
Class: .....

Annex I
(normative)

Manoeuvring trials — Data required

Summary of general data to be monitored and recorded	Trials to execute [a]													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Name of ship	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Yard or building number	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Name of shipbuilder	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Name of owner	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Principal dimensions	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Displacement	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Draught forward — amidships — aft	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Propulsion system characteristics	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Steering system characteristics	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Appendages on underwater hull	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Stability parameters				x	x									
Date and time of trial	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sea area of trial	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Mean water depth in trial area	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Wind conditions	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Sea conditions	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Current conditions	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Elapsed time	x		x	x	x	x			x	x	x	x	x	x
Rudder angle	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Propeller(s) r/min	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Thruster(s) r/min											x	x		
Ship track	x		x	x	x				x	x	x		x	
Ship speed	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Heading (course)	x			x	x	x			x	x	x	x	x	x
Rate of turn		x					x	x						
Drift angle				x										
Roll angle				x										

[a] (1) Coasting stop trial; (2) Pull-out trial; (3) Acceleration trial; (4) Turning-circle trial; (5) Acceleratin- turn trial; (6) Zig-zag trial; (7) Reverse-spiral trial; (8) Direct-spiral trial; (9) Stopping trial; (10) Parallel course trial; (11) Traversing trial; (12) Turning trial with thrusters; (13) Man-overboard trial; (14) Course-change trial.

Annex J
(informative)

Data sheet for manoeuvring trials

Data sheet for trial ____

Key

X time

Y shaft, ship, angular speeds

Figure J.1 — Diagram of shaft, ship and/or angular speeds vs time

Data sheet for turning circles

Rudder angle					
Engines, rotational speed			a	b	c
Time for a turning circle (360°)		by P			
		by S			
Maximum advance		by P			
		by S			
Maximum departure from base track		by P			
		by S			
90° change of heading	Advance	by P			
		by S			
	Transfer	by P			
		by S			
	Time	by P			
		by S			

[a] Normally ENGINE FULL AHEAD.

[b] Normally ENGINE HALF AHEAD.

[c] Normally ENGINE SLOW AHEAD.

Annex K
(informative)

Data sheet for anchor-handling test

Name of ship: Owner:			Shipbuilder:
Anchor-handling system characteristics:			
Anchorage area characteristics: Water depth: Wind:			Place: Type of bottom: Current:
Operation	**Execution** P	**Execution** S	**Comments**
Lowering and hoisting the anchor			
Manual and electromagnetic brakes action			
Mean hoisting speed of the chain (m/s)			
Situation			**Comments**

Annex L
(normative)

Data sheets for noise tests

Table L.1 — Data sheet for noise level test

<table>
<tr><td>Name of ship:</td><td rowspan="2">General conditions of the ship:</td></tr>
<tr><td>Owner:</td></tr>
<tr><td>Shipbuilder:</td><td>Propulsion system:</td></tr>
<tr><td>Test conditions</td><td rowspan="3">Particular conditions of propellers/hull interaction:</td></tr>
<tr><td>Sea condition:</td></tr>
<tr><td>Wave height:</td></tr>
<tr><td rowspan="2">Relative direction of waves:

Wave description:</td><td>Date: Time:
Place:</td></tr>
<tr><td>Measurement equipment identification:

Institution and date of last calibration:</td></tr>
<tr><td>Water depth, m:</td><td rowspan="4">Institution in charge of test:</td></tr>
<tr><td>Draught forward, m:</td></tr>
<tr><td>Draught amidships, m:</td></tr>
<tr><td>Draught aft, m:</td></tr>
<tr><td>Displacement mass, t:</td><td rowspan="2">Test performer:</td></tr>
<tr><td>Propellers immersion (from shaft axis to water level), m:</td></tr>
<tr><td colspan="2">Observations (state important aspects concerning test aims):</td></tr>
</table>

Table L.2 — Data sheet for noise pressure level

Particular test conditions:

Main engines, r/min:

Electric generators in operation:

Air-conditioning and ventilation:

Other:

All doors, windows and air ports shall be closed during measurements; spaces shall empty.□

Location	Space/Pickup location [a]	**Sound pressure level for different octaves and global** [b] dB							
		A	31,5	63	125	250	500	2 000	4 000

[a] Location refers to sketch on page___.

[b] When both maximum and medium values are recorded, they shall be separated by a diagonal, e.g. 68/60.

Bibliography

[1] IMO Resolution A.601 (15), *Provision and Display of Maneuvering Information on Board Ships*

[2] IMO Resolution A.751 (18), *Interim Standards for Ship Maneuverability*

ICS 47.020

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