

Test Code of Propelling Machinery at Sea Trials

1. Scope

This Japanese Industrial Standard specifies the test methods of propelling machinery at sea trials (hereinafter referred to as "trial") which are carried out for newly constructed ships before delivery to owners in order to confirm the ship's speed, performance, etc.

- Remarks: 1. This standard covers general requirements for testing propelling machinery at sea trials, and in case it is difficult to carry out the tests according to this standard, the tests may be carried out on the basis of this standard with some modifications upon agreement among the parties concerned (i.e. surveyor, owner, shipbuilder, etc.).
2. In this standard units and numerical values in [] are in accordance with the conventional system of units, and given for reference only.

2. Sea Trials and Sea Trial Records

The trial shall be carried out according to the predetermined method, and the results shall be summarized in a sea trial record.

A schedule of the trial determined prior to the trial by those parties concerned on kinds of tests, test procedures, measuring particulars (measuring method of output, etc.) and other necessary items is called the trial schedule.

3. Kind of Tests and Methods of Trials

3.1 Mooring Trials The mooring trial is the one to be carried out on a ship moored at a quay in order to check abnormalities of the main engine and associated auxiliaries prior to the trial at sea. After confirmation of the main engine and its related machinery being ready for operation, the mooring trial shall be carried out according to either one of the following procedures.

This trial may be omitted for ships intending to have preliminary trials.

- (1) For the main engine being operated with the propeller connected:
Operate the main engine in ahead and astern directions at a proper output (or rotational speed) continuously for a predetermined period of time. The output and rotational speed of the main engine for the trial must be determined considering the strength of mooring wires (or anchor chains) and bits, and strength and thrust of the propulsion shafting, etc.
- (2) For the main engine being operated with the propeller disconnected:
Operate the main engine in ahead and astern directions at a proper rotational speed continuously for a predetermined period of time.

3.2 Running-in Trial The running-in trial is the one to be carried out with a suitable output (or rotational speed) and time continuously prior to the first operation of the main engine for a long period. At the running-in trial, the output (or rotational speed) of the main engine shall be increased gradually while confirming that there is no abnormalities on the main engine and associated auxiliaries.

This trial may be included in the preliminary trial.

3.3 Preliminary Trials The preliminary trial is the one to be carried out in order to confirm conditions, characteristics and operating data of the propulsion plant beforehand for reference of the official trials. This trial may be omitted at the discretion of the shipbuilder.

3.4 Official Trials The official trial is the one to be carried out officially in order to investigate and confirm reliability and characteristics of the propulsion plant, relation between engine output (or rotational speed) and ship's speed and other items specially stipulated in the contract, etc., and shall be as follows:

Part of this trial may be included in the preliminary trial.

- (1) **Guarantee Speed Test** By making a round trip of consecutive runs between mileposts or by other proper method the guarantee speed test shall be carried out at the predetermined output (or rotational speed) of the ship and main engine output (usually at the maximum continuous output or normal output).

- (2) **Progressive Speed Test** By making a round trip of consecutive runs between mileposts or by other proper method the progressive speed test shall be carried out in three or four conditions of the following alternatives, i.e. at 1/4, 2/4, 3/4 and 4/4 (or output corresponding to the maximum permissible rotational speed) of the maximum continuous output and normal output.
The guarantee speed test may be covered by this test.
- (3) **Overload Test** Generally, the overload test is not required. However, in case of internal combustion engine, if particularly necessary, it may be carried out at an output determined upon agreement among the parties concerned.
- (4) **Endurance Test** The endurance test shall be carried out at least for one hour at the maximum continuous output (or output corresponding to the maximum permissible rotational speed). The speed test, fuel oil consumption test, steering test and turning test may be carried out during this test as considered appropriate.
- (5) **Fuel Oil Consumption Test** The fuel oil consumption test shall be as follows:
 - (a) The fuel oil consumption test shall be carried out continuously for a predetermined period of time at the normal output or maximum continuous output (or output corresponding to the maximum permissible rotational speed).
 - (b) During the fuel oil consumption test, the auxiliaries which are irrelevant directly to operation of the main engine shall, as a rule, not be in operation. However, when such is impracticable, correction to fuel oil consumption may be made.
 - (c) In the case of internal combustion engines, the fuel oil consumption test is normally included in shop test, hence the results of this test are for reference only.
- (6) **Astern Test** During ahead running at the normal output, order full astern, changeover to full astern operation as promptly as possible and continue the astern operation until the astern speed (rotational speed) becomes stable. Then, order ahead, changeover to ahead operation as promptly as possible, increase the output to the normal output and continue running until the ahead speed (rotational speed) becomes stable. During this test, the rudder shall, as a rule, be held at neutral.
Astern rotational speed shall, as a rule, be as follows:
 - (a) **For turbine engines:** Rotational speed corresponding to the designed astern output.
 - (b) **For internal combustion engines:** Rotational speed within the range of 70 to 75% of that corresponding to the maximum continuous ahead output.
- (7) **Minimum Rotational Speed Test** The test shall be carried out in order to confirm the minimum rotational speed at which the internal combustion engine can run smoothly and steadily. It shall be verified that the main engine does not come to stop when steering attempts are made after the rotational speed has settled.
- (8) **Starting Test** For internal combustion engines which require compressed air for starting, raise the pressure in the air reservoir to the determined level without replenishing the air reservoir until the engine can no longer be started, and for reversible engines, start the engine to ahead and astern directions alternately, for non-reversible engines, start and stop alternately.
This test should preferably be carried out with the main engine in a cold state, and the main engine should be started from the control position in the wheelhouse in ships where the main engine can be subjected to remote operation under the bridge control mode of operation, whereas the main engine should be started from the control position in the centralized engine control room in which the main engine can be subjected to remote operation under the engine control mode of operation, respectively.
- (9) **Unmanned Machinery Operation Test** For ships of continuous unmanned machinery operation under all conditions of navigation including in-harbour manoeuvres, normal operation of the machinery and equipment necessary for unmanned machinery operation shall be checked first, then it shall be verified that monitoring and control of the machinery installations from the wheelhouse can