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Ships and marine technology — Marine cranes — Test specifications and procedures

National foreword

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**Ships and marine technology —
Marine cranes — Test specifications
and procedures**

*Navires et technologie maritime — Grues maritimes — Spécifications
et procédures de test*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 8, *Ships and marine technology*, Subcommittee SC 4, *Outfitting and deck machinery*.

Ships and marine technology — Marine cranes — Test specifications and procedures

1 Scope

This document describes the required tests and the testing procedures for marine cranes of metal construction.

This document is applicable to the following types of marine cranes:

- deck cranes mounted on ships for handling cargo or containers in harbour or sheltered water conditions;
- floating cranes or grab cranes mounted on barges or pontoons for operating in harbour conditions;
- engine room cranes, provision cranes, etc. mounted on ships (including floating docks) for handling equipment and stores in harbour conditions.

NOTE Marine cranes in other types can refer to this document.

This document does not apply to the following:

- minimum ambient operating temperatures below -20 °C ;
- maximum ambient operating temperatures above $+45\text{ °C}$;
- loads from accidents or collisions;
- lifting operations below sea level;
- transport, assembly, dismantling and decommissioning of cranes;
- lifting accessories, i.e. any item between the crane and the load;
- lifting operations involving more than one crane;
- hand-powered cranes;
- emergency rescue operations;
- shore-side cargo handling cranes;
- portable cranes on board;
- lifting appliances for lifeboats, liferafts accommodation ladders, and pilot ladders;
- launching appliances for survival craft and rescue boats;
- gangways, accommodation and pilot ladders and their handling appliances.

Cranes defined in this document are intended to comply with the requirements of class societies and flag states. It is also intended that reference be made to ILO and particularly the convention No. 152.

Applicable regulations are those issued by the responsible classification societies and it is intended that national authorities be complied with.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 13202, *Cranes — Measurement of velocity and time parameters*

ISO 14518, *Cranes — Requirements for test loads*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3828, ISO 4306-1, ISO 8431 and ISO 19354 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

bench test

test made on the test bench of the manufacturer

4 Test specification and procedure requirements

4.1 General requirements

4.1.1 The test shall be carried out for the marine crane according to specified technical performances and main parameters shall be verified.

4.1.2 The test load of the marine crane shall comply with ISO 14518.

4.1.3 The measurement of the test speed and time parameters of the marine crane shall comply with ISO 13202.

4.1.4 The marine crane components shall be tested according to applicable regulations.

4.1.5 The marine crane shall be tested according to the test program made by the designer.

4.1.6 The test of the crane shall be recorded. The test record shall contain test conclusions and inspection results. The test record shall record equipment nomenclature, serial numbers, main technical parameters, test durations, test loads, load locations, testing procedures and the results for the various conditions of the test. The tester and inspector shall sign their names on the test record. The user or verifier of the crane test shall also sign the test report for approval, when involved in the test.

4.2 Functional test

4.2.1 General

4.2.1.1 The functional test shall be carried out in the factory before the marine crane is sent out from the factory.

4.2.1.2 The functional test is only required for the internal equipment in the machine room of the crane and it is not necessary to install jibs, wire ropes and hooks on the crane.

4.2.2 Check items before functional test

The following check items shall be completed before the functional test:

- a) compliance of accuracy range and validity period for the test instruments and gauges used with the test;
- b) tight and reliable connection of equipment and devices of the crane;
- c) correctness of electrical wiring;
- d) electric insulation (cold-state).

4.2.3 Functional test items

The functional test shall include following items:

- a) simulation test and check of limit safety function: upper and lower limits of hoisting, upper and lower limits of luffing, slewing limit (for the crane with a limited slew), travelling limit and slack rope limit;
- b) no-load operation of mechanisms: hoisting, luffing, slewing, travelling mechanisms act backward and forward more than three times, to observe whether they are in normal operation;
- c) simulation test and check of the oil temperature switch, if installed;
- d) simulation alarm test and check of the level switch of the oil tank, if installed;
- e) functional test and check of the emergency brake for twice;
- f) other necessary test items.

4.2.4 Check items after functional test

The following check items shall be completed after the functional test:

- a) electric insulation (hot-state);
- b) proper connection of the machinery and components;
- c) other necessary check items.

4.3 Bench test

4.3.1 General

4.3.1.1 The bench test of the marine crane can be carried out in the factory if conditions permit.

4.3.1.2 The bench test is carried out at the test bench of the marine crane.

4.3.2 Pre-test check

The following items shall be checked before the bench test:

- a) check items in [4.2.2](#);
- b) connections of the crane on the bench;

- c) compliance of the installations, such as the power source of the test bench, with requirements;
- d) compliance of the test site conditions and safety installations with requirements.

4.3.3 Bench test items

4.3.3.1 Functional test identical with [4.2.3](#).

4.3.3.2 No-load operational test:

- a) Make the hoisting operation, including lifting and lowering, and reach the upper limit of hoisting.
 NOTE Only simulated action is made for the lower limit.
- b) Make the luffing operation with upper and lower limits.
- c) Make the travelling operation with the travelling limit, if possible.
- d) Rotate from the left and right. The limit test is carried out for the crane with limit requirements.
- e) Measure the maximum and minimum working amplitudes.
- f) Make the hoisting motion; measure and record the lifting and lowering speeds.
- g) Make the luffing motion; measure and record the derricking speed.
- h) Make the slewing motion; measure and record leftward and rightward slewing speeds.
- i) Make the travelling motion; measure and record the travelling speed, if possible.

4.3.3.3 Rated load test. The rated load is the safe working load (SWL).

- a) Make the hoisting motion; measure and record the lifting and lowering speeds.
- b) Make the luffing motion; measure and record the derricking speed, if possible.
- c) Make the slewing motion; measure and record leftward and rightward slewing speeds.
- d) Make the travelling motion; measure and record the travelling speed, if possible.
- e) Carry out the brake test and power failure (i.e. emergency brake) test.
- f) Carry out hoisting, inward luffing and rotation (travelling) tests simultaneously.
- g) Carry out the overload protection test.

4.3.3.4 Overload test. The test load is given in [Table 1](#).

Table 1 — Overload test

Safe working load (kN)	Test load (kN)
SWL ≤ 196	1,25 × SWL
196 < SWL ≤ 490	SWL + 49
SWL > 490	1,1 SWL

Hold the test load still for more than 5 min after placing it at the maximum amplitude (in the middle of the beam for the beam type). Check the condition of the structural elements.

4.3.3.5 For the crane with light load and high speed requirements, the light load and high speed test shall be carried out.

4.3.3.6 Emergency load-release test. The emergency load-release test shall be carried out using a load of no more than the SWL.

4.3.3.7 The test items with other technical program requirements.

4.3.3.8 Work after test:

- a) Check the conditions of the crane at various positions (the same as [4.2.4](#)).
- b) Check hooks, wire ropes, jibs and other components.
- c) Check the hydraulic fluid in the charging pump station.
- d) Check the cleanness of oil filter elements in the charging pump station.

List items a) to d) shall be required if necessary.

4.4 Inclination test

The inclination test may be carried out for the marine crane, based on the special consultation with the user.

The inclination test can be carried out by inclined test bench, or an installed inclined intermediate box on the horizontal test bench. The inclination angle shall be based on the requirements of the agreement. The test method and items shall refer to [4.3](#).

4.5 Other tests

Other tests shall be carried out for the crane according to the test program based on the technical requirements and, if appropriate, facilities are available.

Bibliography

- [1] ISO 3828, *Shipbuilding and marine structures — Deck machinery — Vocabulary and symbols*
- [2] ISO 4306-1, *Cranes — Vocabulary — Part 1: General*
- [3] ISO 8431, *Shipbuilding — Fixed jib cranes — Ship-mounted type for general cargo handling*
- [4] ISO 19354¹⁾, *Ships and marine technology – Marine cranes – General requirements*

1) Under preparation.

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