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Ships and marine technology — Test procedures and methods for windlasses and winches

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Contents

	Page
Foreword.....	iv
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 General requirements.....	1
5 Test procedure.....	2
5.1 General.....	2
5.2 Pre-test check.....	2
5.3 No-load test.....	3
5.4 Drum or warping end load test.....	3
5.5 Drum holding load test.....	3
5.6 Cable-lifter load test.....	4
5.7 Cable-lifter over-load test.....	4
5.8 Cable-lifter brake load test.....	4
6 Test method.....	4
6.1 No-load test.....	4
6.2 Drum or warping end load test.....	5
6.3 Drum brake load test.....	5
6.4 Cable-lifter load test.....	5
6.5 Cable-lifter over-load test.....	5
6.6 Cable-lifter brake load test.....	5
6.7 FAT report.....	5

ISO/PRF 4857

<https://standards.iteh.ai/catalog/standards/sist/109c6750-7f0b-46b8-ba73-3c77c3e5afdf/iso-prf-4857>

Foreword

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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 of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 4, *Outfitting and deck machinery*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Ships and marine technology — Test procedures and methods for windlasses and winches

1 Scope

This document specifies procedures and methods for FAT (Factory Acceptance Test) of the complete set of windlass and winch system after the equipment is assembled.

The test methods and procedures specified in this document apply to windlasses and winches.

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 3828, *Shipbuilding and marine structures — Deck machinery — Vocabulary and symbols*

ISO 4568, *Ships and marine technology — Sea-going vessels — Windlasses and anchor capstans*

ISO 3730, *Shipbuilding and marine structures — Mooring winches*

ISO 6482, *Shipbuilding — Deck machinery — Warping end profiles*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 3828 and the following apply.

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

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

3.1

windlass and winch

a general term for mechanical installations and devices used for anchor handling and mooring
Note 1 to entry: Windlass and winch includes windlasses, anchor capstans, anchor capstans, mooring winches, mooring capstans, combined windlasses/mooring winches and windlasses/mooring capstans.

3.2

windlasses/mooring capstan

installation or device combining functions of the anchor capstan and mooring capstan

4 General requirements

4.1 The tested windlass and winch shall be assembled completely, and all the auxiliaries of the complete set of system shall be tested.

4.2 The relevant performance and parameters of the windlass and winch shall comply with the relevant requirements of ISO 4568, ISO 3730 and ISO 6482.

4.3 An alternative power supply that meets the test requirements can be used instead of the original power supply for testing as agreed by both parties.

4.4 Windlass and winch tests shall be conducted in strict accordance with the sequence specified in the procedures.

4.5 Irrelevant test items of specific products can be deleted according to the function and configuration of the products.

4.6 The windlass and winch shall be fastened to the test bench, and the precision of installation shall meet corresponding requirements specified in the drawings of the windlass and winch.

4.7 The test instrumentation and detection device shall have a valid certificate of conformity, and the precision level shall meet the test requirements.

4.8 When loading via lifting weights, the weight of the test loading lifting weights shall be calibrated.

4.9 For products of the same batch and specification, the first one shall be tested strictly according to the specified time requirements while the rest may be tested in shorter time.

4.10 Only one of the coaxial cable-lifters and drums of the same power source and specifications may be tested.

4.11 Windlass and winch tests shall be recorded and the test report including the test conclusions and results shall be provided.

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5 Test procedure

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5.1 General

Tests shall be carried out under the no-load condition, normal operating condition as well as the overload condition.

5.2 Pre-test check

5.2.1 Pre-test check shall be carried out before all the tests. The tests can only be started after the pre-test is normal.

5.2.2 The pre-test check shall be conducted as follows:

- a) Check the model, specification and factory number of the windlass and winch.
- b) Check if the windlass and winch are complete and if all the auxiliaries are complete and correct.
- c) Check if the installation of the windlass and winch on the test bench meets the requirements.
- d) Check if the test instrumentation and detection device meet the requirements.
- e) Check if the oil and lubricating grease meet the requirements and if the filling-up is sufficient in quantity.
- f) Check if each component is easy to operate.
- g) Check if the test chain cables and ropes meet the requirements.
- h) Check if the test lifting weight meets the requirements when loading via the lifting weight.

5.3 No-load test

5.3.1 Simulation test of the functions of various controls and alarms shall be performed.

5.3.2 The no-load test shall be conducted as follows:

- a) Open all the brakes and engage all the clutches.
- b) Run the windlass and winch at a low speed, ensure the rotating direction of the cable-lifter. The drum and the warping end is the same as the operational direction of the operating device, and add lubricating grease to each lubricating point while operating.
- c) Disengage the cable-lifter clutch. The windlass and winch shall be run continuously without load, 5 min in each direction on each additional gear change.
- d) Disengage the drum clutch and engage the cable-lifter clutch. The windlass and winch shall rotate continuously without load, 5 min in each direction on each additional gear change.
- e) Conduct simulation tests on the functions of various controls and alarms.

5.3.3 The above running time can be adjusted according to the configuration of the product while the total continuous running time without load shall be over 15 min respectively in each direction.

5.3.4 While testing, check if the windlass and winch are running smoothly without any abnormal vibration or noise. The outer surface of the reducer shall not have oil seepage or leakage. Check if there is abnormal heating in each bearing. Check if the speed without load meets the requirements. Check if the functions of various controls and alarms meet the requirements. Conduct the following test after the idling is normal.

5.4 Drum or warping end load test

5.4.1 The drum or warping end load test shall be conducted as follows:

- a) The test wire rope shall be installed according to the direction of the rope required by the drawing.
- b) The drum or warping end shall be lifted and lowered continuously for not less than 3 times at 75 % of the rated load with a working stroke of not less than 6 m.
- c) The drum or warping end shall be lifted and lowered continuously for a total of over 30 min at 100 % of the rated load
- d) For products with the automatic tension function, the load discharging test and recovering test shall be performed at the set tension for over 3 times each.
- e) The automatic braking function shall be tested according to the load and requirements specified in ISO 3730.

5.4.2 While testing, check if the windlass and winch are running smoothly without any abnormal vibration and noise. The outer surface of the reducer shall not have oil seepage or leakage. Check if there is abnormal heating in each bearing. Check if the functions of various controls meet the requirements. Conduct the following test after the above test is normal.

5.5 Drum holding load test

5.5.1 The holding load shall be applied to the drum brake, and it shall be held stationary for 2 min without slip. For drum brakes that are required to meet OCIMF specifications, a special brake test device shall be used for testing, and the braking capabilities withstanding 80% and 60 % of the cable breaking load shall be clearly marked at proper positions.

5.5.2 The test can also be verified by calculation.

5.5.3 The following tests in 5.6 to 5.8 can be performed only after the test is normal.

5.6 Cable-lifter load test

5.6.1 The cable-lifter load test shall be conducted as follows:

- a) The cable-lifter shall be lifted and lowered continuously for not less than 3 times at 75 % of the rated load with a working stroke of not less than 6 m.
- b) The cable-lifter shall be lifted and lowered continuously for a total of over 30 min at 100 % of the rated load.

5.6.2 While testing, check if the windlass and winch are running smoothly without any abnormal vibration and noise; the outer surface of the reducer shall not have oil seepage or leakage; check if there is abnormal heating in each bearing; check if the functions of various controls meet the requirements. Conduct the following test after the above test is normal.

5.6.3 The working stroke of the cable-lifter shall ensure the engagement between each tooth of the cable-lifter and the cable-lifter is checked, namely each tooth of the cable-lifter shall be smoothly engaged with chain cables while testing.

5.7 Cable-lifter over-load test

5.7.1 The cable-lifter shall be lifted and lowered continuously for a total of over 2 min according to the overload pull and requirements specified in ISO 4568. While testing, the automatic braking function shall be tested.

5.7.2 While testing, check if the windlass and winch are running smoothly without any abnormal vibration and noise; the outer surface of the reducer shall not have oil seepage or leakage; check if there is abnormal heating in each bearing; check if the functions of various controls meet the requirements. Conduct the following test after the above test is normal.

5.8 Cable-lifter brake load test

5.8.1 The brake load shall be applied to the cable-lifter brake, and there shall be no slip for 2 min. There shall be no permanent deformation in the equipment.

5.8.2 The test can also be verified by calculation.

NOTE The time for the rated load test specified in 5.4 and 5.6 can be adjusted or converted according to actual product functions, but it shall reflect faithfully the working capability of the product for 30 min at the rated load.

6 Test method

6.1 No-load test

6.1.1 No-load test shall be conducted according to the required procedures so that the brakes and clutches are in the correct state.

6.1.2 The simulation test methods of the functions of various controls and alarms shall reflect faithfully the function requirements and results.

6.2 Drum or warping end load test

6.3.1 The loading method for the rated load test can be lifting weight or other methods capable of verifying the load and speed. The test rope need not be the same as the actual rope of the product, but the load shall be applied after conversion according to the equivalent torque requirements, and the speed shall be converted according to the equivalent rotating speed.

6.3.2 Cylinder loading can be used for the loading of the automatic tension function test to simulate discharging and recovering load. Other methods reflecting faithfully the product functions can also be used.

6.3.3 The automatic braking test can utilize the overloading capacity of the product for lifting and loading. Other methods reflecting faithfully the product functions can also be used.

6.3 Drum brake load test

The drum brake load test can be loaded directly by pulling the wire rope via the cylinder, or other equivalent torque loading methods.

6.4 Cable-lifter load test

The loading method for the load test of the cable-lifter can be lifting weight or other methods capable of verifying the load and speed of the product. For the working stroke of the cable-lifter, the engagement between each tooth of the cable-lifter and chain cables may be tested by section if the conditions don't permit.

6.5 Cable-lifter over-load test

The loading method for the over-load test of the cable-lifter can be lifting weight or other methods capable of verifying the over-load of the product.

6.6 Cable-lifter brake load test

The cable-lifter brake load test can be loaded directly by pulling the wire rope via the cylinder, or other equivalent torque loading methods.

6.7 FAT report

The FAT report shall have the following items:

- a) name of manufacturer;
- b) product name;
- c) factory number;
- d) date of production;
- e) windlass working load and nominal anchor recovery speed;
- f) drum load and speed at the drum load;
- g) the speed at which the drum hauls in the cables without load;
- h) windlass working load, and pressure, current and voltage during the overload test and at the drum load;
- i) ambient temperature of the test;

- j) performance of brakes, clutches, master controllers, electric control boxes, remote controls, brakes, speed measuring devices and length measuring devices.

NOTE Items not included in the contract can be left unfilled.

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