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Ships and marine technology — Sea-going vessels — Windlasses and anchor capstans

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Member bodies are requested to consult relevant national interests in ISO/TC 4 before casting their ballot to the e-Balloting application.

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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

ISO 4568 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology,* Subcommittee SC 4, *Outfitting and deck machinery*.

This third edition cancels and replaces the second edition (ISO 4568:1986), which has been technically revised.

The main changes compared to the previous edition are:

— technical or editorial changes of 1, 2, 3.3, 3.5, 4.4, 4.5.1, 5.4, 6.4 and Annex A;

— addition of 4.10, 4.11 and 6.3.d).

Ships and marine technology — Sea-going vessels — Windlasses and anchor capstans

1 Scope

This document specifies requirements for the design, construction, safety, performance and acceptance testing of windlasses and anchor capstans.

This document is applicable to windlasses and anchor capstans of sea-going vessels which have electric, hydraulic, pneumatic or external drive.

For combined windlasses/mooring winches, ISO 3730 is to be used in addition to this International Standard.

NOTE 1 Where reference is made in the text to "windlass" it should be understood as "windlass and anchor capstan", where applicable.

NOTE 2 Attention is drawn to the requirements of relevant Classification Societies or the government of the state whose flag the ship is entitled to fly.

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 1704, *Ships and marine technology — Stud-link anchor chains*

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

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

ISO 4413, *Hydraulic fluid power — General rules and safety requirements for systems and their components*

ISO 7825, *Shipbuilding — Deck machinery — General requirements*

IEC 60092 (all parts), *Electrical installations in ships*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

3 Terms and definitions

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

3.1
working load of the windlass, F_w
continuous working load that the prime mover of the windlass shall be able to apply for 30 min, derived from the chain cable diameter and the chain cable grade

3.2
nominal size of the windlass
size expressed in terms of chain cable diameter, in millimetres, grade of chain cable, holding load and maximum anchorage depth

Note 1 to entry: When the maximum anchorage depth is below 82,5 m, it shall not be expressed.

EXAMPLE 100/3/45- 100 m is the size designation of a windlass for 100 mm diameter chain cable of IACS [1)]Grade 3, with a holding load of 45 % of the breaking load of the chain cable and the maximum anchorage depth of 100m.

3.3
overload pull
short-time overload capacity necessary for the windlass to break ground, provided by the windlass prime mover

3.4
holding load
maximum static load on the chain cable which the cable-lifter brake can withstand

3.5
nominal recovery speed
average recovery speed from the start of chain cables recovering to surfacing of the anchor where the anchor and chain cables are freely suspended at a specified anchorage depth

3.6
symmetrical double cable-lifter windlass (type 1)
fully powered windlass with two symmetrical cable-lifters (see Figure 1)

3.7
single cable-lifter windlass (type 2)
single fully powered windlass with one cable-lifter (see Figure 2)

3.8
single cable-lifter unit (types 3 and 4)
windlass unit in which one cable-lifter is provided with an external power source (see Figures 3 and 4)

3.9
anchor capstan (type 5)
machine in which the cable-lifter is mounted on a vertical shaft (see Figure 5 and ISO 3828 for the complete definition)

3.10
double cable-lifter windlass with connecting shaft type (type 6)
fully powered windlass in which two drive motors with two cable-lifters are connected by a shaft joint (see Figure 6). The cable-lifter can be driven by either drive motor

3.11
control braking system
devices capable of automatically and stably braking a windlass when the windlass is stopped, downtime, power off or any other non-operating state

3.12 Right- and left-hand windlasses

3.12.1
right-hand windlass
windlass where the drive for the cable-lifter or cable-lifter unit is on the right-hand side of the cable-lifter, in relation to an observer situated on the side of the motor, power supply or controller

3.12.2
left-hand windlass
windlass where the drive for the cable-lifter or cable-lifter unit is on the left-hand side of the cable-lifter, in relation to an observer situated on the side of the motor, power supply or controller

1) International Association of Classification Societies.

3.13
breaking load of the chain cable
minimum breaking load of the chain cable specified by IACS for the diameter and grade of chain cable concerned

3.14
anchorage depth
depth measured as the water height from the sea level at the point of anchoring

Note 1 to entry: 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 https://www.iso.org/obp

4 Design and construction

4.1 Chain cable

This document is based upon the use of three grades of chain cable (see 5.4 and ISO 1704).

4.2 Cable-lifter

4.2.1 The cable-lifter shall have at least five snugs.

4.2.2 The cable-lifter shall be declutchable from the drive. Power-operated clutches shall also be declutchable by hand.

4.3 Warping ends

4.3.1 The windlass may be designed with or without warping ends. The anchor capstan shall be designed with a warping end.

4.3.2 Warping ends may be fitted on the intermediate shaft or on the cable-lifter shaft; for the profile of warping ends, see ISO 6482.

4.4 Mooring Winch

4.4.1 Windlasses may be designed to be with or without winches. Mooring winches shall be designed according to ISO 3730.

4.4.2 Mooring winches can be installed in the intermediate shaft or chain cable shaft.

4.5 Strength requirements

4.5.1 When calculating stress of driving units and other pressed parts according to the rated torque of the prime mover, the stress on such parts shall not exceed 40 % of the yield limit of the materials.

4.5.2 The windlass with brakes engaged and cable-lifter disengaged from drive units shall withstand the holding load given in 5.4 without brake slip; the stress on pressed parts shall not exceed 95 % of the yield limit of the materials.

4.5.3 When the electric motor is stalled or safety valve opened, the stress on pressed parts shall not exceed 95 % of the yield limit of the materials.

4.5.4 When the middle part of the warping end or mooring winch(if any) withstands the minimum breaking force of the fitted cables in the horizontal direction, the stress on windlass pressed parts shall not exceed 95 % of the yield limit of the materials.

4.5.5 When the cable-lifter brake withstands the holding load, the stress on relevant pressed parts shall not exceed 80 % of the yield limit of the materials.

4.5.6 When calculating the stress, attention shall be paid to

a) stress concentration in keyways and other stress raisers;

b) dynamic effects due to sudden starting or stopping of the prime mover or chain cable;

c) that calculations are made according to classical theory for stress calculation, if the calculations based on finite element simulation are not applicable to the above strength requirements.

4.6 Braking system

4.6.1 Control braking system

4.6.1.1 Electric windlasses shall be provided with a fail-safe braking mechanism such that the brakes are automatically engaged when the operating device is in the stop or braking position, or when there is no power to the electric motors. The brake shall be capable of holding a load on the chain cable of 1,5 times the working load of the windlass.

4.6.1.2 For other types of drives, a suitable fail-safe system of braking shall be agreed upon between the purchaser and manufacturer. Such a system shall be capable of holding a load on the chain cable of least 1,3 times the working load of the windlass.

4.6.2 Cable-lifter brake

4.6.2.1 Each cable-lifter shall be fitted with a hand brake, which may be remotely controlled and which is capable of applying a braking torque sufficient to maintain a load equal to the holding load given in 5.4.

4.6.2.2 When designing cable-lifter brakes, attention shall be paid to

a) The brake torque direction of the cable-lifter brake shall be adapted to the direction of anchoring;

b) The cable-lifter brake shall be capable of controlling the calculated load produced by the weight of the chain cables and windlass at a specified anchorage depth (the anchor and chain cables are freely suspended); apply the brake for each casting of a shot of chain cable, to stop the chain cable with slip of not more than 7 m, and the force on hand wheels shall not exceed 160 N;

c) When the cable-lifter brake withstands the holding load, the force on handles or hand wheels shall not exceed 750 N. It shall be operable for two persons.

4.7 Emergency stop

4.7.1 Each remotely controlled windlass shall be fitted with a quick-acting, local, emergency stop mechanism which, when operated, removes power from the windlass and applies the control braking system.

4.7.2 The emergency stop shall be located in a clearly marked and accessible position close to the windlass.

4.8 Protection

4.8.1 Prime movers and gearing shall be protected against excessive torque and shock.

4.8.2 Cable-lifter and gearing shall be protected against excessive torque developed by the prime mover.

4.9 Speed control

The speed of rotation of the cable-lifter shall be adjustable between "no load" speed and stop. It shall be possible to make the adjustment while the windlass is working.

4.10 Direction of motion of operating devices

4.10.1 The operation of the windlass shall be in accordance with ISO 7825.

4.10.2 The direction of operation of all control handles or hand wheels shall be clearly and permanently marked. It shall be such that the anchor is weighed or the brake is applied by movement of a handle towards the operator or alternatively clockwise movement at a hand-wheel, and vice versa.

4.10.3 Whatever the form of motive power used, the operating device shall, when under manual control, be arranged to return to the braking or stop position automatically, unless otherwise agreed between the manufacturer and purchaser.

4.11 Drive equipment

4.11.1 Electrical drives and control equipment shall conform to the requirements of IEC 60092. Open deck mounted enclosures shall conform to IEC 60529, and/or to the appropriate degree of protection for the service and environment in which the equipment is installed.

4.11.2 Electric motor shall conform to the requirements of classification societies. Electric motor with rated power of 100 kW and above shall be certified by classification societies. Electrical drive and control equipment shall conform to IEC 60092. Open deck mounted enclosures shall conform to IP56 of IEC 60529 or to the appropriate degree of protection for the service and environment in which the equipment is installed.

4.11.3 Protection of electric motor cables and size of cables shall conform to the requirements of classification societies. Cables installed on open deck shall be provided with effective mechanical protection.

4.11.4 Hydraulic drives and control equipment shall conform to the requirements of ISO 4413.

4.12 Remote control devices

Each remotely controlled machine part shall be operated locally by hand.

5 Requirements

5.1 The requirements given in 5.4 are based on the use of one cable-lifter at a time.