INTERNATIONAL STANDARD

ISO 4568

Third edition
2006-12-01

Shipbuilding — Sea-going vessels — Windlasses and anchor capstans

Construction navale — Navires de haute mer — Guindeaux et guindeaux-cabestans

Reference number
ISO 4568:2006(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

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.

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.

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.

Shipbuilding — Sea-going vessels — Windlasses and anchor capstans

1 Scope

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

This International Standard is applicable to windlasses and anchor capstans of sea-going vessels which have electric, hydraulic, steam 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 referenced documents are indispensable to 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 1704, *Ships and marine technology — Stud-link anchor chains*

ISO 3730, *Shipbuilding — Mooring winches*

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

ISO 4413, *Hydraulic fluid power — General rules relating to systems*

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
working load, derived from the chain cable diameter and the chain cable grade, measured at the cable-lifter

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

EXAMPLE 100/3/45 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.

3.3
overload pull
necessary short time overload capacity of the windlass

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

3.5
nominal recovery speed
average speed of recovery of two shots of chain cable when three shots are submerged and freely suspended at the start of lifting

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 Right- and left-hand windlasses

3.10.1
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

3.10.2
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

3.11
breaking load of the chain cable
minimum breaking load specified by IACS for the diameter and grade of chain cable concerned

3.12
anchorage depth
depth measured as the water height from the sea level at the point of anchoring

---

1) International Association of Classification Societies.

4 Design and construction

4.1 Chain cable

This International Standard 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 should 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 Strength requirements

4.4.1 If a cable stopper (see ISO 6325) is fitted, the windlass with brakes engaged and cable-lifter disengaged shall withstand a pull of 45 % of the breaking load of the chain cable without any permanent deformation of the pressed parts and without brake slip.

4.4.2 If a cable stopper is not fitted, the windlass with brakes engaged and cable-lifter disengaged shall withstand a pull of 80 % of the breaking load of the chain cable.

4.4.3 The stresses on those parts of the windlass and the windlass frame concerned shall be below the elastic limit of the material used.

NOTE Attention is to 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) calculation methods and approximations used when deriving the design stresses.

4.5 Braking system

4.5.1 Control braking system

Electric windlasses shall be provided with an automatic braking system which goes into operation when the operating device is in the stop or braking position, or when there is no power on the windlass. The brake shall be capable of holding a load on the chain cable of 1,5 times the working load of the windlass.

For other types of drive, a suitable system of braking should 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.

4.5.2 Cable-lifter brake

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 Emergency stop

4.6.1 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.

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

4.7 Protection

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

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

4.8 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.

4.9 Direction of motion of operating devices

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

The direction of operation of all control handles shall be clearly and permanently marked.

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.

4.10 Drive equipment

4.10.1 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.

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

4.11 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.

5.2 The windlasses shall be capable of continuous operation for a period of 30 min while exerting the working load and also be capable of exerting, for a period of at least 2 min at reduced speed, the overload pull stated in 5.4.

5.3 The chain cable nominal speed shall be not less than 0,15 m/s. A standard anchor, a hawse-pipe efficiency of 70 % and a buoyancy factor of 87 % are assumed.

5.4 The following values shall be used in determining performance data for windlasses.

a) Working load, F_{w1}, in newtons, for anchorage depth down to 82,5 m:

— Grade 1 chain cable: $37{,}5d^2$,

— Grade 2 chain cable: $42{,}5d^2$,

— Grade 3 chain cable: $47{,}5d^2$,

where

d is the chain cable diameter, in millimetres;

— overload pull: $1{,}5F_{w1}$.

b) Working load, F_{w2}, in newtons, for anchorage depth deeper than 82,5 m:

— $F_{w2} = F_{w1} + (D - 82{,}5) \times 0{,}27d^2$,

where

d is the chain cable diameter, in millimetres,

D is the anchorage depth, in metres;

— overload pull: $\geqslant 1{,}5F_{w1}$.

c) Holding load:

— with chain cable stopper, 0,45 times the breaking load of the cable;

— without chain cable stopper, 0,8 times the breaking load of the cable.

6 Acceptance tests

6.1 The tests and checks specified in 6.2 to 6.5 shall be carried out on the windlass or windlass unit. When tests are required in excess of those specified in 6.2 to 6.5, they shall be agreed between the purchaser and the manufacturer at the time of contract. The location of all tests shall be agreed between the purchaser and the manufacturer at the time of contract.

6.2 The windlass shall be run without load at a speed not less than nominal speed for 30 min, 15 min in each direction, plus 5 min in each direction on each additional gear change as soon as possible after the 30 min test.

While testing, the following shall be checked or measured:

a) tightness against oil leakage;

b) temperature of bearings;

c) presence of abnormal noise.

6.3 The windlass shall be checked to verify that the working load, nominal speed and overload pull are attainable as specified in 5.2.