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Shipbuilding and marine structures — Mooring winches

Construction navale et structures maritimes — Treuils d'amarrage

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Contents

Page

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 3730 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 3730:1988), which has been technically revised.

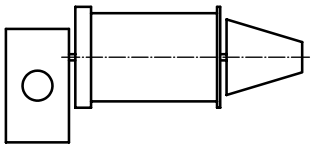
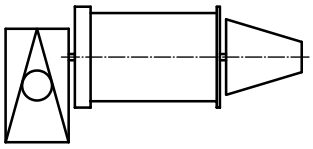
Shipbuilding and marine structures — Mooring winches

1 Scope

This International Standard specifies requirements for the design, operation, performance and acceptance tests of automatic and non-automatic mooring winches, with hydraulic, electric or steam drive, which fulfil the functions of manoeuvring, holding and storing mooring ropes on a single drum.

Such winches can also be used for warping purposes. See Table 1.

Table 1 — Functions

Operation	Non-automatic mooring winch	Automatic mooring winch
		
Mooring	On drum	
Rope storing	On drum	
Tension-maintaining through brake	On drum	
Warping	Optional on warping-end or on drum	
Tension-maintaining through automatic device		On drum

2 Normative references

The following referenced documents are indispensable for 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 2408, *Steel wire ropes for general purposes — Minimum requirements*

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

ISO 4413, *Hydraulic fluid power — General rules for the application of equipment to transmission and control systems*

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

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
right-hand winch
winch where the drum drive is on the right-hand side of the drum, in relation to an observer situated on the side of the motor, power supply or controller

NOTE See Figure 1.

3.2
left-hand winch
winch where the drum drive is on the left-hand side of the drum, in relation to an observer situated on the side of the motor, power supply or controller

NOTE See Figure 1.

3.3
central winch
winch where the drum drive is between the two drums

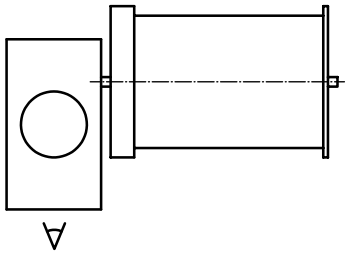
NOTE See Figure 1.

3.4
single drum winch
winch where one drum is driven by drive equipment

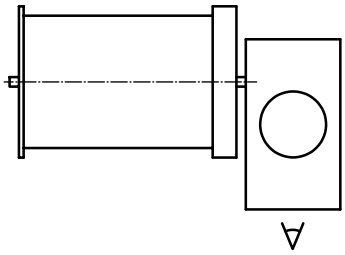
NOTE See Figure 1.

3.5
multiple drum winch
winch where two or more drums are driven by drive equipment

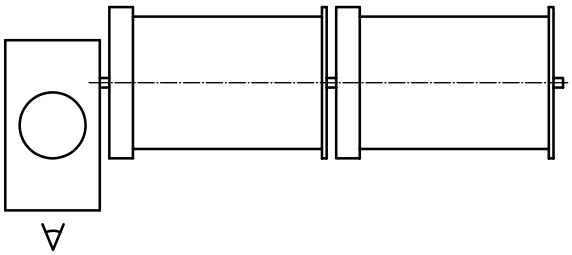
NOTE See Figure 1.



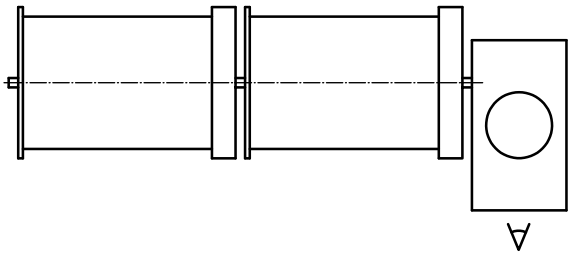
Left-hand single drum winch



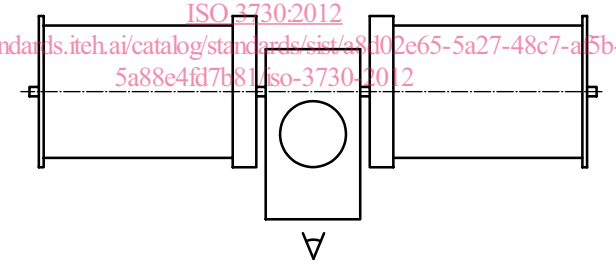
Right-hand single drum winch



Left-hand multiple drum winch



Right-hand multiple drum winch



Central multiple drum winch

Figure 1 — Winch type diagram

4 Design and operation

4.1 General requirements

Mooring winches shall meet the general requirements for deck equipment in ISO 7825 and the specific requirements given in 4.2 to 4.8.

NOTE Attention is drawn to the existence of safety regulations in certain countries and organizations affecting winch controls.

4.2 Material stresses

The winch manufacturer shall be responsible for determining the strength requirements of the component parts of the winch to withstand all loads of the respective nominal sizes of mooring winches, as specified in Table 2.

4.3 Strength requirements

4.3.1 Winch drum load

The allowable calculated stresses of any affected part of the winch, based on simple elastic theory, shall not be greater than 0,4 times the upper yield strength (R_{eH}) or the 0,2 % proof strength, non-proportional extension ($R_{P0,2}$) of the material.

4.3.2 Maximum torque of prime mover

The allowable stresses in the affected parts shall not be greater than 0,9 times the upper yield strength (R_{eH}) or the 0,2 % proof strength, non-proportional extension ($R_{P0,2}$) of the material.

4.3.3 Winch holding load

The allowable calculated stresses of the affected parts shall not be greater than 0,9 times the upper yield strength (R_{eH}) or the 0,2 % proof strength, non-proportional extension ($R_{P0,2}$) of the material.

4.3.4 Other requirements

Related requirements of OCIMF should also be satisfied for mooring winches used in tankers.

4.4 Operating devices

The direction of motion of the operating devices shall be such that the rope is hauled-in by clockwise movement at a hand-wheel or crank handle or alternatively movement of a hand-lever towards the operator, and vice versa.

If it has been agreed between the purchaser and manufacturer, the rope may be hauled in by anti-clockwise movement at a hand-wheel or crank handle.

The direction of motion of the operating devices shall be clearly and permanently marked.

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

4.5 Brakes

4.5.1 Automatic braking system

Electric winches shall be provided with an automatic braking system which operates when bringing the operating device to the stop or braking position, and also when there is no power on the winch. The brake shall be capable of holding a load on the hawser of 1,5 times the drum load and of stopping the drum rotation from its maximum speed without suffering damage.

For winches of hydraulic or steamdrive, when bringing the operating device to the stop or braking position, and also when there is no power on the winch, the drum shall be capable of holding a load on the hawser of 1,25 times the drum load, and the movement of the rope shall be controlled within 1,0 m/min.

4.5.2 Drum brake

All drums shall be provided with a drum brake capable of maintaining the holding load specified in 5.2.

For mooring winches used in tankers, the structure and performance of drum brakes should satisfy the requirements of OCIMF.

For tankers, they should also satisfy the requirement of OCIMF that each ship should reserve a complete set of brake test devices.

4.6 Drum design

4.6.1 Design rope

4.6.1.1 Steel wire ropes

For design purposes, the drum shall be based on 6×36WS-IWRC or 6×41WS-IWRC steel rope manufactured from 1 770 N/mm^2 tensile grade wire in accordance with C.9 of ISO 2408.

The above requirement does not preclude the use of other types of steel wire rope in service.

4.6.1.2 Synthetic fibre ropes

General synthetic fibre ropes or high modulus synthetic fibre mooring lines may be used.

4.6.2 Drum diameter

4.6.2.1 Round strand wire ropes

The drum diameter shall be not less than 16 times the diameter of the rope.

4.6.2.2 Synthetic fibre mooring lines

The drum diameter shall be not less than 6 times the diameter of the synthetic fibre mooring line.

For high modulus synthetic fibres, the ratio of drum diameter and rope shall meet the requirements of the rope manufacturer.

4.6.3 Drum capacity

Drum capacity shall be of two capacities, “normal” and “high”. The minimum length of design rope to be stored on normal-capacity drums is given in column 12 of Table 2. High-capacity drums shall store twice the length of rope of normal-capacity drums.

4.6.4 Drum length

a) The drum length of normal-capacity drums shall be such that the total length of the design rope can be accommodated in not more than five layers. If it has been agreed between the manufacturer and purchaser, the layers should be applicable to other layers.

b) The drum length of high-capacity drums shall be such that the total length of the design rope can be accommodated in not more than eight layers.

c) The large loads should not be applied while more than four layers of rope are reeled on the drum, otherwise short life of rope will result; it is recommended that a split drum should be used, and the number of layers on the storage section may be increased.

d) The length of the working part of a split drum: for steel wire ropes and high modulus synthetic fibre ropes, the length of the working part of the drum shall be enough for winding of 10 turns; for general synthetic fibre ropes, it shall be enough for winding of 5-6 turns.

4.6.5 Drum flange height