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Ships and marine technology — Piling barge winches

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Foreword

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

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Ships and marine technology — Piling barge winches

1 Scope

This document specifies the requirements for the design, operation, performance and acceptance test of the hydraulic or electric winches in piling barge winch systems.

This document specifies the winches required to operate the pile and the pile hammer during piling of the piling barge, mainly including the suspending pile winch, hammer start winch, suspending hammer winch and suspending hose winch.

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 2408:2017, *Steel wire ropes — Requirements*

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, *Degree 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.

ISO and IEC maintain terminology 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

suspending pile winch

hauling or lifting device used to lift the piles to the piling frame during piling of the piling barge

Note 1 to entry: piling frame is high frame for installing the piles during piling of the piling barge.

3.2

hammer start winch

hauling or lifting device used to start the pile hammer

3.3

suspending hammer winch

hauling or lifting device used to lift and lower the pile hammer during piling of the piling barge

**3.4
suspending hose winch**

hauling or lifting device used to haul in or pay out high-pressure hose or cable during piling of the piling barge

**3.5
piling barge winch**

general term for the *suspending pile winch* (3.1), *hammer start winch* (3.2), *suspending hammer winch* (3.3), and *suspending hose winch* (3.4) required to operate the pile and the pile hammer during piling of the piling barge

**3.6
rated load**

load the *piling barge winch* (3.5) can withstand when hauling in the cables at rated lifting speed

**3.7
rated speed**

maximum speed the *piling barge winch* (3.5) can reach when hauling in the cables at the *rated load* (3.6)

**3.8
brake load**

load the brake for the *piling barge winch* (3.5) can withstand

**3.9
expansion clutch**

clutch used between the *suspending hammer winch* (3.3) drum and the drive to allow for clutch engagement and disengagement by clamping or separating the friction band and the inner face of the brake hub

4 Types

According to the structure, winches can be divided into five types as described below and as shown in [Figure 1](#).

a) Right-hand winch

The drive for the drum is on the right-hand side of the drum, in relation to an observer situated on the side of the power supply or controller.

b) Left-hand winch

The drive for the drum is on the left-hand side of the drum, in relation to an observer situated on the side of the power supply or controller.

c) Central model winch

The drive for the drum is located between two drums.

d) Single drum winch

One drive powers one drum.

e) Double drum winch

One drive powers two drums.

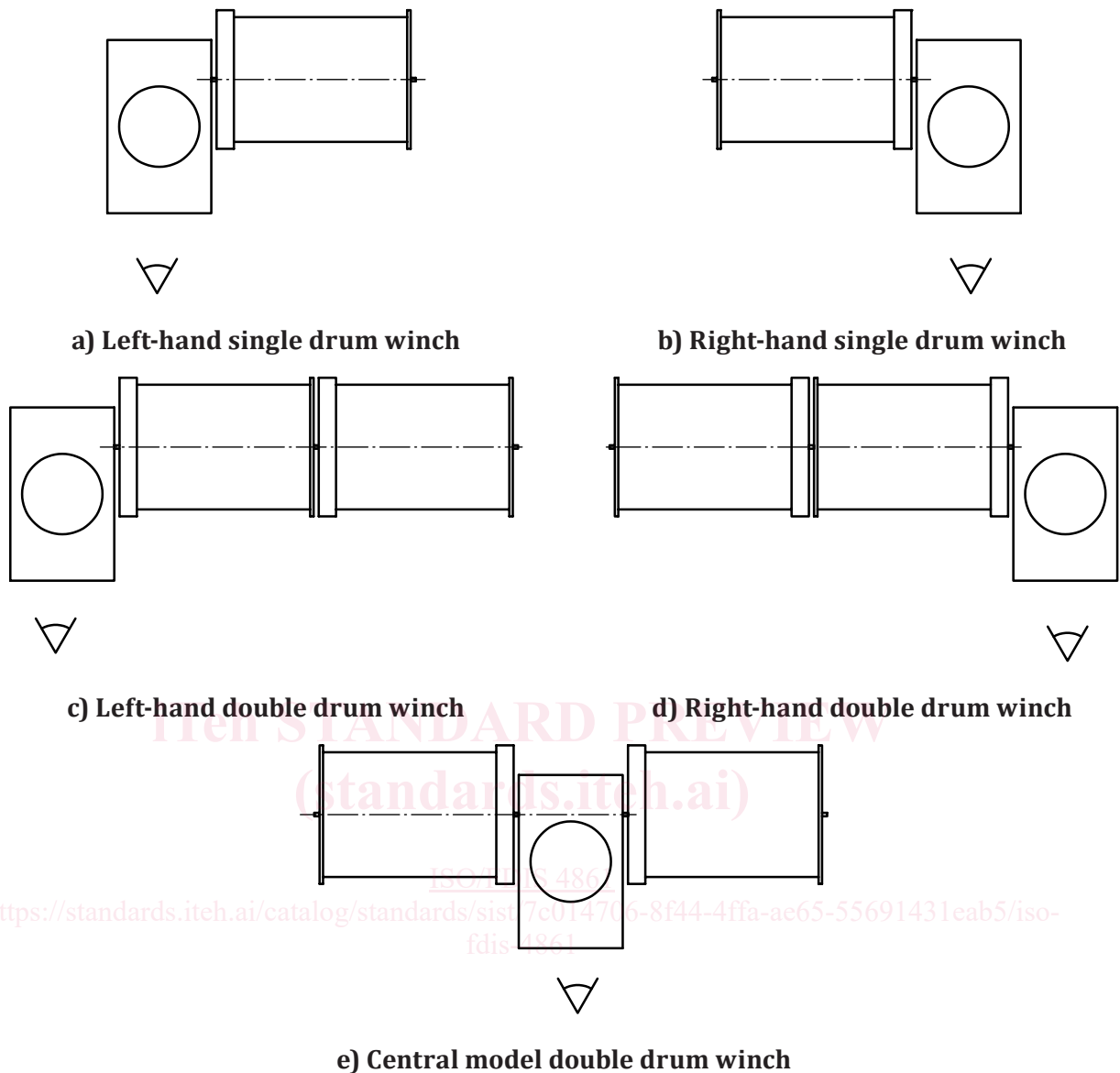


Figure 1 — The diagram for types of winches

5 Design and operation

5.1 General requirements

Piling barge winches shall conform to the requirements in ISO 7825 and the specific requirements listed in 5.2 to 5.8. Attention is drawn to the existence of safety regulations in certain countries and organizations affecting piling barge winch controls.

5.2 Material stress

The winch manufacturer shall be responsible for determining the strength requirements of the component parts of the winch to withstand the required load under various working conditions.

5.3 Strength requirements

5.3.1 Rated load

The calculated stress of any affected part, based on simple strength theory, shall not be greater than 0,4 times the lower yield strength (R_{eL}) or the 0,2 % proof strength, non-proportional extension ($R_{e0,2}$) of the part material.

5.3.2 Brake load

The calculated stress of any affected part shall not be greater than 0,9 times the lower yield strength (R_{eL}) or the 0,2 % proof strength, non-proportional extension ($R_{e0,2}$) of the part material.

5.4 Operating device

5.4.1 The direction of motion of the operating devices shall be such that the rope is hauled-in by a clockwise movement at a hand-wheel or crank handle, or alternatively movement of a hand-lever towards the operator. The opposite is also possible, whereby the rope is hauled-out by an anticlockwise movement at a hand-wheel or crank handle, or alternatively movement of a hand-lever away from the operator.

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

5.4.3 Whatever the form of motive power, the operating hand-wheel or crank handle shall, when under manual control, be arranged to return to the braking or stop position automatically.

5.5 Brake device

5.5.1 Automatic braking device

5.5.1.1 The electric winch shall be fitted with an automatic braking device 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 rated load and of stopping the drum rotation from its maximum speed without suffering damage.

5.5.1.2 For hydraulically driven winches, 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 rated load, and the movement of the rope shall be controlled within 1,0 m/min.

5.5.2 Drum braking device

The piling barge winch shall be fitted with a drum braking device. The device shall be capable of effectively braking and supporting not less than 1,5 times the rated load. The drum braking device shall be normally closed and support both automatic and manual operation.

5.6 Drum design

5.6.1 Design reference steel wire ropes

5.6.1.1 For design purposes, the drum shall be based on $6 \times 36WS-IWRC$ or $6 \times 41WS-IWRC$ steel-cored rope manufactured from 1 770 N/mm² tensile grade wire, in accordance with ISO 2408:2017, Annex D. The minimum breaking load of the steel wire rope shall be not less than 5 times the rated load of the drum.

5.6.1.2 The above requirements in [5.6.1.1](#) does not preclude the use of other types of rope in service.

5.6.2 Drum diameter

The drum diameter shall be not less than 18 times the diameter of the steel wire rope.

5.6.3 Drum capacity

The drum capacity shall be such that the required length of steel wire ropes can be wound.

5.6.4 Drum length

5.6.4.1 The piling barge winch has an undivided drum. The drum length shall be such that the steel wire rope can be wound on fully in not more than 5 layers.

5.6.4.2 When calculating the length of the drum, each layer of steel wire rope shall be superimposed directly upon each other without placement between the lower two layers of ropes.

5.6.5 Drum flange height

5.6.5.1 For the winch with a rope guide, when all the rope is reeled on a drum of regular capacity, the height of flange beyond the outer layer of rope shall be not less than the diameter of the rope.

5.6.5.2 For the winch without a rope guide, when all the rope is reeled on a drum of regular capacity, the height of flange beyond the outer layer of rope shall be not less than 2,5 times the diameter of the rope.

5.6.6 Drum clutch

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5.6.6.1 For the suspending hammer winch, a clutch shall be fitted between the drum and the drive. The expansion clutch is recommended to ensure a reliable stop of the pile hammer in case of rapid pile sinking.

5.6.6.2 Other types of clutches can also be used if agreed between the manufacturer and the purchaser. However, the structure and function of the suspending hammer winch shall ensure a reliable stop of the pile hammer in case of rapid pile sinking.

5.7 Auxiliary device

5.7.1 Rope guide

5.7.1.1 The piling barge winch shall be fitted with an automatic rope guide.

5.7.1.2 The automatic rope guide may not be provided if agreed between the manufacturer and the purchaser.

5.7.2 Ratchet mechanism

5.7.2.1 The suspending hammer winch shall be fitted with a ratchet mechanism with a braking capacity of 1,5 times the rated load.

5.7.2.2 Other types of braking devices can be used in place of a ratchet mechanism if agreed between the manufacturer and the purchaser.

5.7.3 Vertical stroke limiter

The piling barge winch shall be fitted with a vertical stroke limiter to limit excessive hauling in and paying out of steel wire ropes.

5.7.4 Operating device for paying out cables

The piling barge winch shall be fitted with control equipment for lowering with load to ensure cables with load are paid out at a steady and controllable speed.

5.8 Drive device

5.8.1 Electrical drives and control equipment shall conform to the requirement of the IEC 60092 series. Deck-mounted enclosures shall conform to IP56, as specified in IEC 60529, or degrees of protection in line with environment for installation and use of equipment.

5.8.2 Hydraulic drive and control equipment shall conform to the requirements of ISO 4413.

5.8.3 The prime mover of the piling barge winch shall meet the following conditions:

- a) the piling barge winch shall be driven with an independent prime mover, and be able to control the veering and speed of the drum;
- b) it shall have the capacity to run for 30 min continuously under rated load at nominal speed.

6 Performance

6.1 Specifications and performance

The main specifications and performance parameters of piling barge winches are shown in [Table 1](#).

Table 1 — Specifications and performance parameters

Nominal Specification		8	9	10	11	12	13	14	15	16	17	18	19
Rated load kN		80	90	100	110	120	130	140	150	160	170	180	190
Rated speed m/min	A series	10	10	10	10	10	10	10	10	10	10	10	10
	B series	20	20	20	20	20	20	20	20	20	20	20	20
	C series	40	40	40	40	40	40	40	40	40	40	40	40
Nominal Specification		20	25	30	35	40	45	50	55	60	65	70	75
Rated load kN		200	250	300	350	400	450	500	550	600	650	700	750
Rated speed m/min	A series	10	10	10	10	10	10	10	10	10	10	10	10
	B series	20	20	20	20	20	20	20	20	20	20	20	20
	C series	40	40	40	40	40	40	40	40	40	40	40	40

NOTE The load and speed in the table indicate data of the first layer of rope wound on the drum. If the outermost layer is designated, refer to the above data or make conversion.

6.2 Light load speed

The light load speed of piling barge winches shall be not less than 2 times the rated speed.