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Secretariat: SAC

Ships and marine technology — Winches for trailing suction hopper dredger

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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/directiveswww.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.htmlwww.iso.org/iso/foreword.html.

This document was prepared by Technical Committee 8, *Ships and marine technology*, Subcommittee 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.www.iso.org/members.html.

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Ships and marine technology — Winches for trailing suction hopper dredger

1 Scope

This document specifies the requirements for the design, operation, performance and acceptance test of the hydraulic or electric winches for trailing suction hopper dredgers.

This document specifies the winches required to operate the suction pipe during dredging of the trailing suction hopper dredger winch, mainly including the draghead winch, gimbal winch and trunnion 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.

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ISO 2408:2017, *Steel wire ropes — Requirements*

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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*

ISO 8384, *Ships and marine technology — Dredgers — Vocabulary*

ISO 8385, *Ships and marine technology — Dredgers — Classification*

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

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

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 3828, ISO 8384, ISO 8385 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~~https://www.iso.org/obp

— IEC Electropedia: available at ~~https://www.electropedia.org/~~https://www.electropedia.org/

3.1
draghead winch
hauling or lifting device installed near the fore of the suction pipe (draghead), used for hoisting and lowering the fore of the suction pipe

3.2
gimbal winch
hauling or lifting device installed near the middle of the suction pipe (gimbal joint), used for hoisting and lowering the middle of the suction pipe

3.3
trunnion winch
hauling or lifting device installed near the trunnion of the suction pipe, used for hoisting and lowering the trunnion of the suction pipe

3.4
suction pipe winch
general term for the *draghead winch* (3.1), *gimbal winch* (3.2) and *trunnion winch* (3.3)

3.5
rated load
load that the *suction pipe winch* (3.4) can withstand when hauling in the cables at rated lifting speed

3.6
rated speed
maximum speed the *suction pipe winch* (3.4) can reach when hauling in the cables at the *rated load* (3.5)

3.7
maximum load
~~maximum load~~most weight the *suction pipe winch* (3.4) can withstand

4 Types

According to the structure, winches can be divided into two types as ~~follows. See~~described below and as shown in Figure ~~-~~1.

a) ~~right~~ 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~~ 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.

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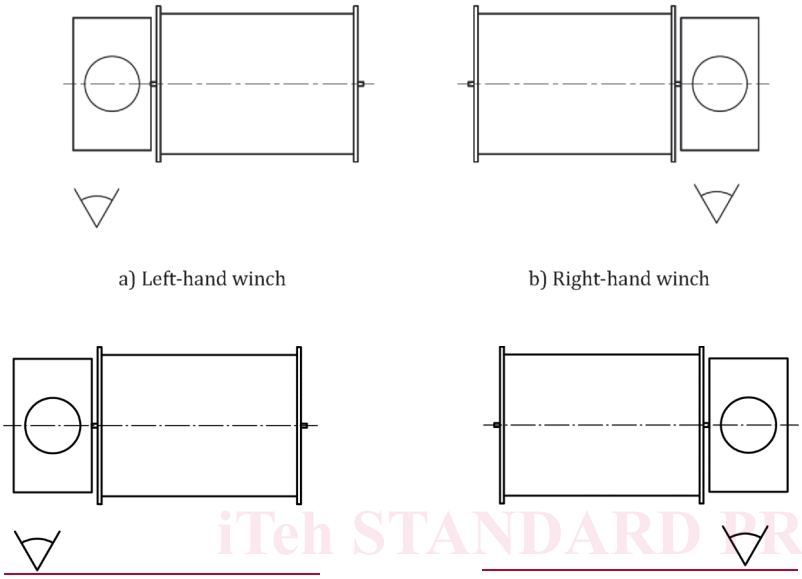

Figure 1 ~~— The diagram~~ — Diagram for types of winches

5 Design and operation

5.1 General requirements

The suction pipe winch shall conform to the requirements in ISO 7825 and the specific requirements listed in 5.2 to 5.8 of this document. Attention is drawn to the existence of safety regulations in certain countries and organizations affecting suction pipe 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.

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5.3.2 Maximum 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 clockwise movement at a hand-wheel or crank handle or alternatively, movement of a hand-lever towards the operator, vice versa.

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 The suction pipe 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.

5.5.2 The braking device shall be capable of effectively braking and supporting not less than the maximum load.

5.6 Drum design

5.6.1 Design reference steel wire rope

5.6.1.1 The design shall be 6 × 36WS-IWRC or 6 × 41WS-IWRC in accordance with ISO 2408:2017, Annex D, with a strength grade of 1 770 N/mm² and a minimum breaking load not less than 5 times the rated load of the drum.

5.6.1.2 The length of the selected steel wire rope shall be such that at least 5 layers of steel wire ropes can be reeled on the drum under any working condition.

5.6.1.3 The above requirement in 5.6.1.2 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 steel wire ropes.

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

The drum length shall be such that the required length of steel wire ropes can be wound in a single layer.

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5.6.5 Drum flange height

Under any working condition, the height of flange beyond the outer layer of rope shall not be less than 2,5 times the diameter of the rope.

5.7 Drive device

5.7.1 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 the environment for installation and use of equipment.

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

5.7.3 The prime mover of the suction pipe winch shall meet the following conditions:

a) the suction pipe 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.

5.8 Auxiliary device

The suction pipe winch shall be fitted with a device that can ensure on-loaded cables are paid out at a steady and controllable speed.

6 Performance

The main specifications and performance parameters of suction pipe winches are shown in Table 1.

Table 1 — Specifications and performance parameters

Nominal specification		10	20	30	35	40	45	50	55	60	65	70	75
Rated load kN		100	200	300	350	400	450	500	550	600	650	700	750
Maximum load kN		200	400	450	520	600	670	750	820	900	970	1000 1 000	1100 1 100
Rated speed m/min	A series	-	-	-	-	6	6	6	6	6	6	6	6
	B series	12	12	12	12	12	12	12	12	12	12	12	12
	C series	18	18	18	18	18	18	18	18	-	-	-	-

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7 Acceptance test

7.1 General

The factory acceptance test shall be performed after the suction pipe winch is assembled at the manufacturer.

7.2 No-load test

It shall run for 30 min, 15 min continuously in each direction.

7.3 Rated load test

7.3.1 Haul and veer the rated load of the winch for 30 min continuously.

7.3.2 The test can be carried out on board if agreed between the manufacturer and the purchaser.

7.4 Maximum load test

7.4.1 The winch shall be lifted and lowered for 3 times under the maximum load. While lowering, the winch with load shall be stopped 3 times for 2 min respectively. The drum shall brake effectively and not rotate in "stop" status.

7.4.2 The test can be carried out on board if agreed between the manufacturer and the purchaser.

7.5 Check items during testing

While testing, the following shall be checked:

a) tightness against oil leakage;

b) temperature of bearing;

c) presence of abnormal noise;

d) rotating speed of the drum.

8 Designation

8.1 Model designation

Figure 2 illustrates the model designation. See

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