INTERNATIONAL STANDARD ISO 3078

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Shipbuilding — Cargo winches

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FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3078 was drawn up by Technical Committee ISO/TC 8, *Shipbuilding*, and circulated to the Member Bodies in March 1973.

It has been approved by the Member Bodies of the following countries :

Australia	India	Poland
Austria	Israel	Romania
Belgium	Italy	Sweden
Czechoslovakia	Japan	Thailand
Denmark	Mexico	Turkey
Finland	Netherlands	United Kingdom
France	New Zealand	U.S.S.R.
Germany	Norway	

No Member Body expressed disapproval of the document.

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Shipbuilding — Cargo winches

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the characteristics of cargo winches on cargo derricks, especially winches with electric or hydraulic drive.

2 DEFINITIONS

2.1 Nominal size

The nominal size of a cargo winch corresponds to the nominal load, i.e. the maximum working load, expressed in tonnes, at the hook which the winch is rated to lift in direct operations (with a single sheave at the derrick-head and a single sheave at the foot).

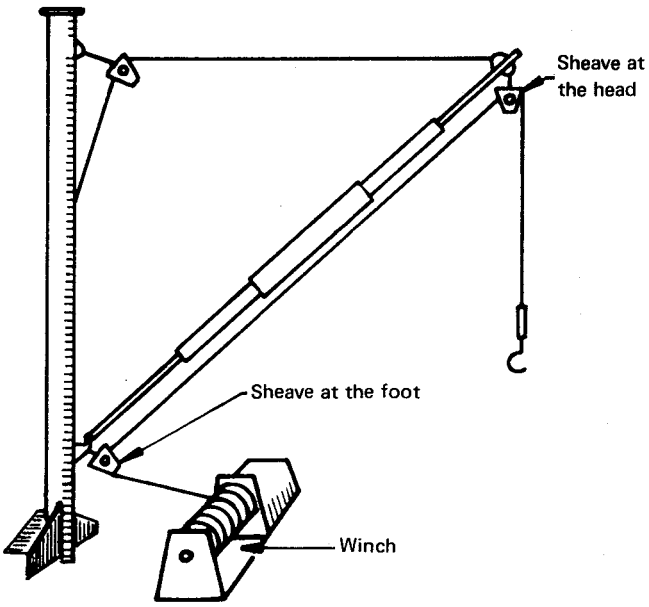

FIGURE 1 — **Example of use of a winch**

Winches are graded according to their nominal size as given in the performance table (see clause 5).

If the winch is provided with a reduction gear having several gear changes, each step should correspond to a nominal load in the performance table.

NOTES

1 The nominal sizes are derived from the preferred number series.

2 The definition of the nominal size given above is not applicable to heavy derricks.

2.2 Nominal speed of hoisting

The nominal speed of hoisting is the speed at which the winch is capable of lifting the nominal load.

The minimum nominal speeds of hoisting are given in the performance table.

2.3 Drum load of a winch

The drum load of a winch is the maximum rope tension, in kilonewtons (kN), measured at the drum exit when the winch is hauling in at the nominal speed with the rope wound on the drum in a single layer.

NOTE — The drum load is approximately 11 times the nominal load measured in tonnes. The factor of 11 takes account of the loss through friction due to the sheaves and of the ratio between force in kilonewtons and mass in tonnes.

2.4 Right-hand and left-hand cargo winches

A winch is termed a right-hand winch in relation to an observer situated on the side of the motor, power supply or controller (in the case of a symmetrical winch), when the reduction gear or the drive for the drum is on the right-hand side of the drum. (See figure 2.)

A winch is termed a left-hand winch in relation to an observer situated on the side of the motor, power supply or controller (in the case of a symmetrical winch), when the reduction gear or the drive for the drum is on the left-hand side of the drum.

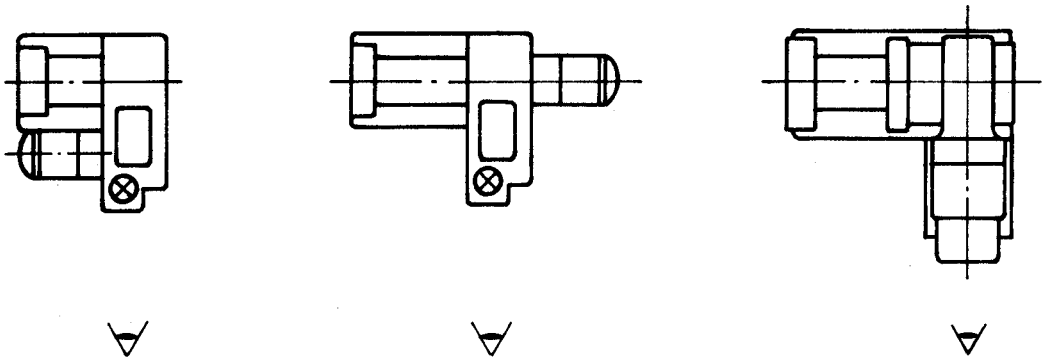

FIGURE 2 — **Examples of right-hand winches**

3 DESIGN AND OPERATION OF A WINCH

3.1 Stress calculation

The stress calculation of the mechanical parts is based on :

3.1.1 The drum load of the winch : in which case the allowable calculated stresses based on simple elastic theory of any part of the winch must not be greater than 0,4 times the 0,2 % proof stress of the material.

3.1.2 The maximum torque of the motor corresponding to the most severe working conditions : in which case the allowable stresses shall be within 0,9 times the 0,2 % proof stress of the material.

3.2 Direction of motion of the operating devices

The direction of motion of the operating devices shall be such that the load is raised by clockwise movement at a hand-wheel or crank handle or alternatively movement of a hand-lever towards the operator.

Unless otherwise specified by the purchaser, and whatever the form of motive power, the operating device shall be arranged to return to the braking position automatically when the operator releases the control.

NOTE — Reference should be made to the I.L.O. Code of practice on safety and health in dock work.

3.3 Acceleration and deceleration

In direct manoeuvre at drum load, the acceleration and deceleration should have a mean value of not more than 3 m/s^2.

3.4 Braking

3.4.1 Winches shall be provided with an automatic braking system which operates when bringing the operating device to zero, or to the braking position, and also when there is no power on the winch.

3.4.2 The braking system shall be capable of effectively arresting and holding a load at least 1,5 times the nominal load.

Means shall also be provided for lowering the load in the event of power failure.

3.4.3 Winches with a declutchable drum shall be provided with a locking device, or a brake on the drum capable of preventing the rotation of the drum.

When a brake is required to hold the load, this shall be specified by the purchaser.

3.4.4 The braking system shall be such as not to induce a shock load.

3.5 Drum design

For all operating conditions, the distance between the top layer of the wire rope on the drum and the outer edge of the drum flanges shall be at least 2,5 times the diameter of the wire rope.

NOTE — This requirement only concerns drums not fitted with special wire rope guards to prevent over-spilling of the wire rope.

The diameter of the drum shall be not less than 18 times the diameter of the wire rope, which for design purposes only should conform to ISO 2408, *Steel wire ropes for general purposes — Characteristics,* Tables 7 or 12, columns 4 or 5. Other grades and constructions may be used in service.

3.6 Warping-ends

A winch may be specified with or without warping-ends.

When warping-ends are specified the purchaser shall state whether the drum is to be declutchable or not.

If only one warping-end is specified, its position (right or left) is to be stated in the order.

4 ACCEPTANCE TESTS

4.1 Rules concerning the tests at manufacturer's works for acceptance by the purchaser

Tests shall be carried out at the manufacturer's works, but where this is not possible the tests may be carried out at a place to be agreed between the manufacturer and purchaser.

The result of the tests carried out in accordance with 4.1.1 and 4.1.2 shall be stated in the test certificate.

4.1.1 *Type testing*

One winch of each type shall be tested in accordance with 4.1.1.1 and 4.1.1.2.

This test may be replaced by a prototype test certificate if agreed between the manufacturer and purchaser.

Where tests are required in addition to the type test, these shall be agreed between the manufacturer and purchaser at the time of contract.

4.1.1.1 *Testing in working conditions* : The test should be carried out as follows :

1) 30 min continuous hoisting and lowering, through a distance of 10 m under drum load conditions allowing 20 s pause between consecutive cycles, plus 5 min similar cycling on each additional gear change, as soon as possible after the 30 min test.

2) While testing, the following shall be checked or measured :

a) Abnormal temperature of bearings.

b) Actual speed for hoisting and lowering.

c) Power input (watts).

3) The travel of the load on operation of the brake system shall be checked. The operation of the automatic brake shall be checked when the power is switched off.

4.1.1.2 Test on overload : The test shall be carried out by hoisting a load equal to 1,25 times the nominal load. During the lowering operation, the winch shall be stopped at least three times.

4.1.2 *Individual test*

The test shall be carried out as follows :

1) 30 min running at maximum speed without load (15 min in each direction of rotation).

2) When the winch is provided with a reduction gear change, each gear change shall be tested for an additional 5 min at maximum speed.

3) While testing, the following shall be checked or measured :

a) Tightness against oil leakage.

b) Temperature of bearings.

c) Presence of abnormal noise.

d) Power input (watts).

e) Rotation speed of the drum in each direction.

4) At the end of the test, the winch should be run through the full range of speed as a check for vibration.

4.2 On board acceptance tests

This test shall be carried out at the same time as the test of the complete cargo rig, and shall consist of at least one hoisting and one lowering of a load equivalent to the test load of the derrick without checking the speed.

The load at the winch shall not exceed 1,25 times the drum load unless otherwise agreed between the purchaser and manufacturer.

5 PERFORMANCES OF WINCHES

The performances of cargo winches are given in the table below.

Nominal size		2	3	5	8	12	16
Nominal load (mass), in tonnes		2	3,15	5	8	12,5	16
Drum load, in kilonewtons		22	35	56	90	140	180
Minimum nominal speed of hoisting V_1 (m/s)	Series A	0,50	0,32	0,20	0,12		
	Series B	1,0	0,63	0,40	0,25	0,16	0,12
	Series C			0,80	0,50	0,32	0,25
Maximum speed of setting down the load V_2 (m/s)		0,25	0,20	0,20	0,12	0,10	0,08

6 DESIGNATION OF A CARGO WINCH

A cargo winch is designated in an abridged form by the following items :

— Winch (E for electric and H for hydraulic drive) — nominal size — speed series (A, B or C)

— Reference to ISO 3078

— Right-hand or left-hand winch model (R or L)

— Number and, where applicable, position of warping ends (R : on the right, and L : on the left)

— Add "X" when drum is declutchable

Additional items should be given where applicable, for example :

— current (direct current or alternating current), voltage, frequency

— hydraulic fluid pressure and flow rate.

Example :

Designation of an electric cargo winch, of nominal size 5, series B, left-hand model, with one warping end on the right and declutchable drum, voltage 440 V, alternating current, frequency 60 Hz :

E WINCH 5 B ISO 3078 L 1 R X 440/60