
International Standard



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Shipbuilding — Trawl winches

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

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 6115 was developed by Technical Committee ISO/TC 8, *Shipbuilding*, and was circulated to the member bodies in April 1980.

It has been approved by the member bodies of the following countries :

Austria	India	Poland
Belgium	Ireland	Romania
Brazil	Italy	Spain
China	Japan	United Kingdom
Czechoslovakia	Korea, Dem. P. Rep. of	USSR
Finland	Korea, Rep. of	Yugoslavia
France	Netherlands	
Germany, F. R.	Norway	

No member body expressed disapproval of the document.

Shipbuilding — Trawl winches

1 Scope and field of application

This International Standard specifies requirements and characteristics of single-drum and double-drum trawl winches provided with electric, electro-hydraulic, hydraulic diesel or externally powered drive.

The winches are provided for hauling-in, paying-out and holding the trawl rope while fishing by means of trawling fishing gear.

When equipped with additional auxiliary drums, they may be also used for auxiliary operations when hauling-in, paying-out and emptying the trawl net.

2 References

ISO 2408, *Steel wire ropes for general purposes — Characteristics*.

ISO 3828, *Shipbuilding — Deck machinery — Vocabulary*.

3 Definitions

Definitions are to be as in ISO 3828, except for the following terms :

3.1 nominal size : For a single-drum trawl winch, a nominal size corresponds to the drum load on the trawl rope drum (in tonnes), as stated in the table.

For a double-drum trawl winch, a nominal size corresponds to twice the drum load stated in the table.

3.2 drum load : The maximum trawl rope tension, measured at the drum exit with a trawl rope being hauled-in at the nominal speed and being wound onto the appropriate nominal trawl rope winding diameter of the drum.

3.3 design torque : For a single-drum winch, the design torque is the driving torque available at the drum. It results from the drum load applied to the half-length rope nominal trawl rope winding diameter.

For a double-drum winch, the design torque is two times the design torque of a single-drum.

3.4 Nominal trawl rope winding diameter

3.4.1 winding diameter full-length rope : Diameter when the whole design length of the rope has been wound onto the drum, i.e. it corresponds to the outermost layer of the rope.

3.4.2 winding diameter half-length rope : Diameter when half of the design length of the rope has been wound onto the drum.

3.5 nominal speed of a trawl rope : Maximum hauling-in speed of a rope obtainable by the winch at drum load applied to the appropriate nominal rope winding diameter.

3.6 Paying-out speed of a trawl rope

3.6.1 paying-out speed under regenerative braking (or equivalent type of braking) : Maximum paying-out speed of a rope obtainable by the winch at 0,5 drum load applied to the appropriate nominal rope winding diameter, while paying-out the rope by means other than a friction brake.

3.6.2 paying-out speed under friction braking : Twice the nominal speed at 0,5 drum load applied to the appropriate nominal rope winding diameter, while paying-out the rope using the friction brake.

3.7 single-drum trawl winch : Winch equipped with one main trawl rope drum (L1-R1) (see the figure).

3.8 double-drum trawl winch : Winch equipped with two main trawl rope drums, double in line or waterfall, provided with a common drive (L2-R2-C2-L2W-R2W) (see the figure).

3.9 right-hand and left-hand single-drum trawl winch : Winch is termed a right-hand winch in relation to an observer situated on the side of the motor, power supply or controller when the reduction gear or the drive for the drum is on the right-hand side of the main drum.

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

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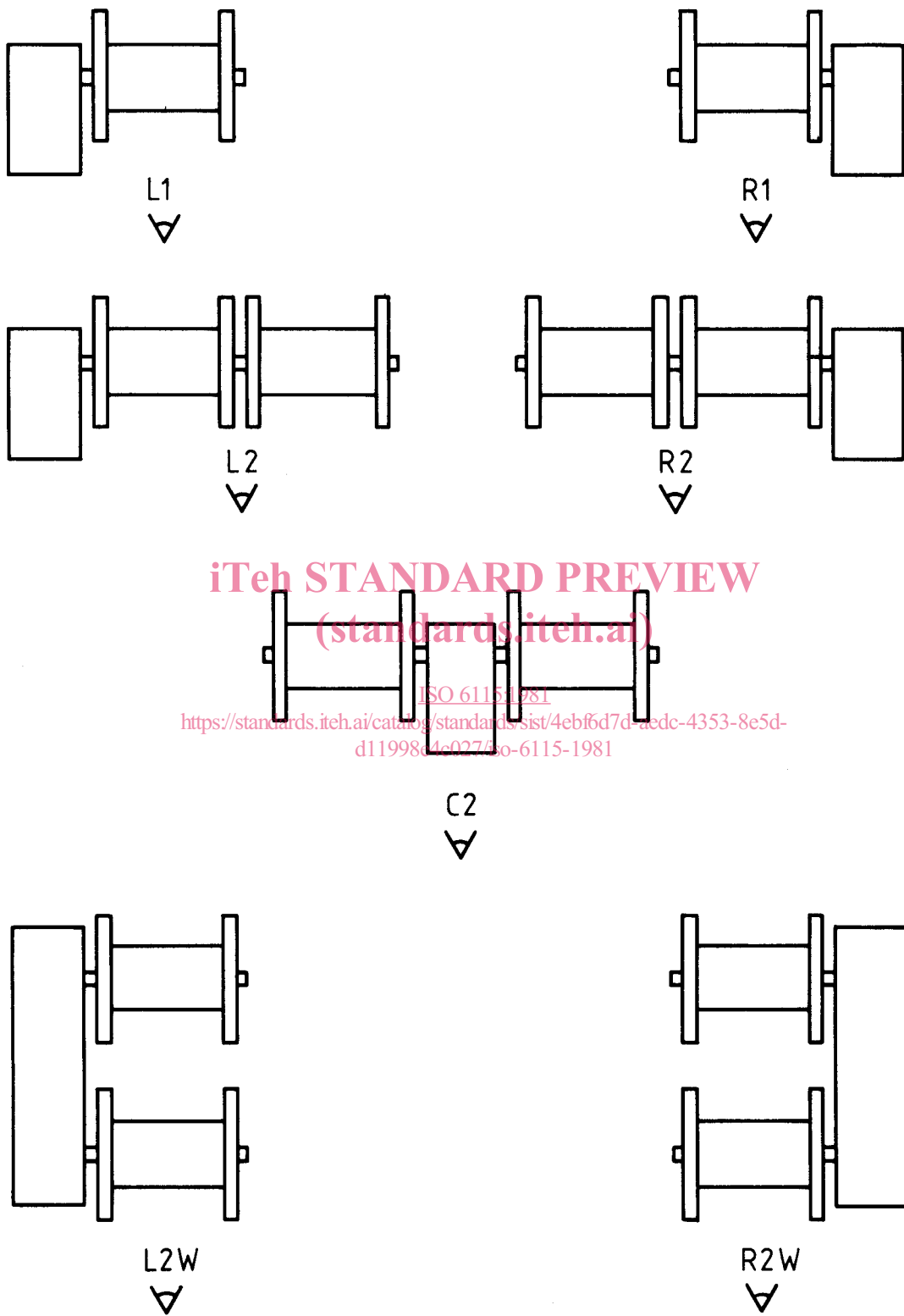


Figure — Examples of right-hand (R), left-hand (L), and central (C), single- and double-drum trawl winches

4 Design and operation

4.1 Auxiliary equipment

4.1.1 The trawl winches may be also provided with auxiliary drums and warping ends.

If auxiliary drums or warping ends are provided, their positions and characteristics shall be agreed between the purchaser and the manufacturer.

4.1.2 A spooling gear is to be fitted to the main drum in order to get uniform winding of a trawl rope, unless otherwise agreed between the purchaser and the manufacturer.

The auxiliary drums may also be provided with spooling gears, if agreed between the purchaser and the manufacturer.

Provisions shall be made for manual adjustment of any spooling gear fitted.

Mechanical spooling gear (if fitted) shall be designed to operate against the drum load, at fleet angles up to 6° per side in horizontal and vertical planes.

If the spooling gear is automatically driven, it shall be possible to disengage the spooling carriage. Subject to agreement between manufacturer and purchaser, the spooling gear shall be adaptable to wires of more than one diameter.

4.2 Control and measuring instruments

4.2.1 A trawl winch may be provided with an instrument to measure the tension in the trawl rope, if agreed between the purchaser and the manufacturer. The equipment shall be capable of measuring the tension while the rope is being paid out, hauled in and trawling the fishing gear. The measurement of tension may be replaced by the measurement of torque at the drum whilst trawling, if agreed between the purchaser and the manufacturer. It is recommended for winches greater than nominal size 4 that the tension should be measured without contact of the measurement instruments (pick-up) with the trawl rope.

4.2.2 A trawl winch may be provided with an instrument to measure the length of paid-out trawl rope, if agreed between the purchaser and the manufacturer. Instrument error should not exceed 0,15 % of the trawl rope lengths.

4.2.3 A trawl winch may be provided with instruments to measure the electrical and/or hydraulic values as agreed between the purchaser and the manufacturer.

4.3 Signalling devices

If agreed between the purchaser and the manufacturer, a trawl winch may be provided with adequate signalling devices giving necessary information on :

- a) the winch and its components being ready for operation;

- b) which components of the winch are being operated;
- c) the engaging of clutches and/or drum brakes;
- d) failure of winch components;
- e) overloads and other dangerous conditions, for example :
 - the trawl rope being wound on the first layer on the drum while paying-out the fishing gear,
 - no release of the automatic brake,
 - allowable temperature of the electric motor windings being exceeded,
 - slipping of the trawl drum while trawling the fishing gear,
 - overloading of the spooling gear.

4.4 Protection

4.4.1 Overload protection of trawl winches shall be provided during hauling in. It shall operate under overload not exceeding 1,5 times the value of drum load at the outermost layer of a trawl rope being fully wound onto the drum, unless a higher value is agreed between the purchaser and the manufacturer. A time interval protection device should be fitted to overcome the transient overloads experienced in service. When the protection device of one winch has operated, the second winch stops simultaneously.

4.4.2 Facilities for paying-out the rope under the overload of a winch, while trawling the fishing net, shall be provided. For overloads up to 1,5 times the drum load at the outermost layer, a multi-step or continuous control of such device shall be possible. If agreed between the purchaser and the manufacturer, the device may operate automatically in which case the possibility of switching off the device shall be provided. Brake release should be provided as well, if agreed between purchaser and manufacturer.

4.4.3 Means protecting against paying-out of the whole length of a trawl rope from the main drum may be provided. Not less than 20 windings of the trawl rope shall still remain wound onto the drum when such means have operated, unless otherwise agreed between the purchaser and the manufacturer.

4.4.4 Emergency means of stopping the winch shall be provided. They shall be fitted at the winch position and at the remote control position where one exists and near the rope sheaves. For single-drum trawl winches, the single operation, where practicable, shall cause the stopping of both winches.

4.4.5 Protection against overspeeding of the drive during paying-out shall be provided.

4.5 Control

4.5.1 Control position

For each trawl winch, a local or remote control (or a combined remote and local control) shall be provided.

For single-drum trawl winches, a separate control of each trawl winch shall be provided.

NOTE — Some national authorities require local control on all trawl winches.

4.5.2 Direction of motion of operating devices

The direction of motion of operating devices shall be such that the trawl rope or auxiliary rope is hauled-in by clockwise movement of a hand-wheel or crank handle or alternatively by movement of a hand lever towards the operator. The direction of operation of all control handles shall be clearly and permanently marked.

4.5.3 Remote control

According to the agreement between the purchaser and the manufacturer, the remote control shall provide the operating conditions for simultaneous operation on main drums; common and synchronous operation.

4.6 Brakes and braking

4.6.1 Brakes

Each winch shall be provided with an automatic braking system which operates when bringing the operation device to zero, or to the braking position, and also when there is no power supply on the winch. Means should be provided for hand release of the brake.

4.6.2 Selective brake

Each declutchable drum of the winch shall be provided with its own selective brake. The drum brake may also act as an automatic brake of normally closed type. The brake handle force during manual braking or during braking should not exceed 0,25 kN.

4.6.3 Braking torque

The total available braking torque shall be at least 1,5 times the design torque. The brakes shall be adjustable, unless otherwise agreed between the purchaser and the manufacturer.

4.6.4 Regenerative braking

For regenerative braking, the rated load of the brakes is to be 0,5 times the design torque. In this case the paying-out speed of a trawl rope shall result from the respective number of revolutions of a driving motor and the characteristics of a drive.

4.6.5 Friction braking

The drum brake of a trawl winch when paying-out the rope shall be capable of absorbing the power at a torque equal to 0,5 times the design torque and at drum revolutions corresponding to twice the nominal speed. The power shall be absorbed for two periods equal to rope length multiplied by speed of winch separated by 15 min. Cooling of brakes to meet this specification will be acceptable. The use of friction braking does not exclude the use of regenerative braking.

4.7 Ambient temperature

The winches shall be designed for satisfactory operation of their components at a temperature range within -25 to $+45$ °C, when located on open decks, and at a temperature range within -10 to $+45$ °C when located in enclosed compartments; however a different lower limit may be agreed between the purchaser and the manufacturer.

4.8 Material stresses

The manufacturer of the winch shall be responsible for determining the strength requirements of the component parts of the winch to withstand all loads of the respective nominal size of trawl winch.

4.9 Basic calculations

4.9.1 When a trawl winch with a trawl rope being wound on the outermost layer is loaded with the drum load, the allowed calculated stresses, based on simple elastic theory, of any part of the winch shall not be greater than 0,4 times the 0,2 % proof stress of the material but not more than 0,28 times the breaking strength of the material.

4.9.2 The affected parts of a winch as well as its fixing to the base plate shall be designed with due regard being paid to the possibility of rupture of a trawl rope being wound on the appropriate nominal rope winding diameter on the drum. In such a case, the allowed calculated stresses shall not be greater than 0,9 times the 0,2 % proof stress of the material.

4.9.3 The affected parts of a winch shall be designed taking into account the maximum torque of a prime mover and maximum braking torque. In such a case, the allowed calculated stresses shall not be greater than 0,8 times the 0,2 % proof stress of the material.

4.9.4 The selection of design trawl ropes shall prevent the possibility of their rupture under loads derived from the prime mover of the winch.

4.10 Drum design¹⁾

4.10.1 Design rope

For design purposes, the drum shall be based on a 1 570 N/mm² tensile grade rope with the fibre core in accordance with ISO 2408.

1) Attention is drawn to the existence of certain national safety requirements.

NOTE — The above requirement does not preclude the use of other types of ropes in service.

4.10.2 Drum diameter

The drum diameter shall not be less than 14 times the diameter of the design rope.

4.10.3 Drum flange height

When all the rope is reeled, the flange shall project at least 2,0 times the rope diameter above the outermost layer, when a spooling gear is fitted. When no spooling gear is fitted, the projection shall be at least 4 rope diameters.

4.10.4 Drum clutch

The drums of double-drum trawl winches as well as of winches provided with auxiliary drums or warping ends shall be de-clutchable type.

5 Designation

Trawl winches conforming to this International Standard shall be designated as follows :

- a) trawl winch;
- b) the number of this International Standard;
- c) type of drive :
 - E = electric
 - D = diesel
 - H = hydraulic
 - EP = externally-powered;
- d) nominal size (according to table);
- e) handing of winch : (see the figure)
 - C = central
 - R = right-handed
 - L = left-handed
- f) drum arrangement : (see the figure)
 - 1 = single-drum
 - 2 = double-drum in line
 - 2W = double-drum waterfall

Example of designation of a trawl winch according to ISO 6115, hydraulically powered (H), of nominal size 12, right-handed (R), with double-drum waterfall (2W) :

Trawl winch ISO 6115 H 12 R 2W

6 Performance

The trawl winch shall be capable of obtaining the characteristics specified in this International Standard and indicated in the table.

Trawl winches shall have smooth speed control (adjustment); stepped control is also allowed. The minimum hauling-in speed shall not exceed 15 m/min. When agreed between manufacturer and purchaser, the necessary special conditions for re-winding trawl rope shall be provided.

7 Acceptance tests

7.1 Rules concerning the acceptance tests of the winch by the purchaser

7.1.1 No load test without the use of the rope : In hauling-in and paying-out directions at nominal speed for 10 min and, where appropriate, with maximum speed for 1 min.

7.1.2 Test of hauling-in of the trawl rope at approximately the design torque on the drum for approximately the full length of the trawl rope.

7.1.3 Test of hauling-in of the trawl rope at 125 % of drum load on appropriate nominal rope winding diameter for 3 min with stopping and reversing.

NOTE — The tests specified in clauses 7.1.2 and 7.1.3 may be carried out with equivalent weights. Interruptions are allowed.

The pull value, while carrying out the tests with a trawl rope, may be determined depending on the layer of rope being wound in relation to that at the design torque.

7.1.4 Each braking system shall be tested with 1,5 times the design torque applied to the winch drum.

7.1.5 While testing, the following shall be checked :

- a) presence of abnormal temperature of bearings;
- b) presence of abnormal noise;
- c) power consumption;
- d) minimum design hauling speed;
- e) values of pressure;
- f) easy and satisfactory operation of components;
- g) proper operation of spooling gear, if fitted;
- h) operation of measuring instruments, if fitted;
- j) operation of protecting devices, interlocks and switches, where practicable;
- k) operation of signalling devices, where fitted;
- m) operation of controls.

7.2 The winch is to be subjected to final acceptance tests during mooring trials of the ship and/or during her fishing trials

at sea, according to her test programme, to the extent agreed between the purchaser and the manufacturer.

Table – Design data for trawl winches

Type	Nominal size	Minimum drum load kN		Minimum nominal speed of trawl rope m/s	Design rope diameter mm	Design length of trawl rope	
		full length rope (see 3.4.1)	half length rope (see 3.4.2)			m min.	m max.
A	0,63	5	6,3	1,0	14	500	800
	1,0	7,5	10	1,0	14	500	800
	1,6	12	16	1,0	16	500	1 000
	2,0	16	20	1,0	16	800	1 200
	2,5	18,5	25	1,33	18	800	1 600
	3,2	25	31,5	1,33	20	1 500	1 800
	4,0	30	40	1,67	22	1 000	2 000
	6,3	47	63	1,67	24	1 250	2 500
	8,0	60	80	1,67	28	1 500	3 000
B	4,7	47	63	2,0	24	2 000	3 000
	6,0	60	80	2,0	28	2 500	3 500
	7,5	75	100	2,0	28	3 000	4 500
	9,4	94	125	2,0	28	3 000	4 500
	12	120	160	2,0	32	3 000	4 500
	15	150	200	2,0	36	3 500	5 000
C	9	63	85	1,0	24	1 000	1 500
	11	80	106	1,0	28	1 250	2 000
	17	125	166	1,0	28	1 500	2 500
	19	140	186	1,0	28	1 500	2 500
	21	160	212	1,0	32	1 500	2 500
	27	200	266	1,0	36	1 500	2 500

NOTES

- 1) The rope lengths and diameters quoted for design purposes in the table do not preclude the fitting of ropes of other qualities, diameters or lengths in service.
- 2) For Types A, B and C, see annex B.

Annex A

(Forms an integral part of the standard)

Mechanical characteristics of the winches

If agreed between the purchaser and the manufacturer, the trawl winches may have a mechanical characteristic (revolutions, torque on the drum) corresponding to the constant output curve for hauling-in the net.

The maximum torque within the constant output curve shall amount to not less than 1,5 times the design torque.

In addition, it is recommended that the number of revolutions of the drum be increased by 1,5 times with respect to the number of revolutions at design torque when the torque decreases below the rated value within the constant output curve.

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Annex B

ISO 6115:1981

(Not an integral part of the standard)

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Type A is primarily intended for demersal fishing.

Type B is primarily intended for deep water fishing.

Type C is primarily intended for pelagic fishing.