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आवश्यकताएं

(आई एस 11474 का प्रथम पुनरीक्षण)

Draft Indian Standard

**POWER OPERATED WINDLASSES AND ANCHOR CAPSTANS
FOR INLAND VESSELS — GENERAL REQUIREMENTS**

(First Revision of IS 11474)

(ICS no 47.060)

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Inland, Harbour Crafts and Fishing Vessels Sectional Committee, TED 18

FOREWORD

This draft Indian Standard (First Revision) will be adopted by the Bureau of Indian Standards on the recommendation of the Inland Harbour Crafts and Fishing Vessels Sectional Committee and approval of the Transport Engineering Division Council.

This standard was first published in 1985. This first revision is being undertaken to update the standard by incorporating technological upgradation and latest shipping practices. The salient features of this first revision are:

- a) The standard has been drafted as per latest drafting guidelines.
- b) Reference of latest Indian Standard have been given for definitions.
- c) Requirements have been modified after considering chain cable stopper and requirements of international classification society.
- d) Designation of windlass/ capstan has been modified.
- f) Clauses related to Marking, BIS Certification and Sampling have been added.

In the formulation of this Indian Standard, considerable assistance has been taken from

IS 8650 : 2015 'Shipbuilding and marine structures — Deck machinery — Vocabulary and symbols'.

The composition of the Committee responsible for the formulation of this standard is given at Annex B (Will be added later).

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Draft Indian Standard

**GENERAL REQUIREMENTS OF POWER OPERATED WINDLASSES AND
ANCHOR CAPSTANS FOR INLAND VESSELS**

1 SCOPE

1.1 This standard lays down the requirements for the design, construction, safety, performance and acceptance testing of windlasses and anchor capstans for inland vessels having electric, hydraulic, steam or external drive.

1.2 The requirements covered in this standard are not applicable for special purpose crafts like dredgers, etc.

2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

<i>IS No.</i>	<i>Title</i>
4484 : 1975	Electrically welded stud link anchor chains and connecting shackles and swivels (First Revision)
4692 : 1977	Electrically welded stud-less link anchor chains and connection shackles (First Revision)

7937 : 2012	Shipbuilding — Sea-going vessels — Windlasses and anchor capstan (Third Revision)
8650 : 2015	Shipbuilding and marine structures — Deck machinery — Vocabulary and symbols

3 DEFINITIONS

For the purpose of this standard the definitions given in IS 7937 and IS 8650 shall apply in addition to the following.

3.1 Creep Speed of the Anchor Chain

The greatest speed of the chain when pulling the anchor into the hawse-pipe (*see* 6.4).

3.2 Nominal Speed of Anchor Chain

The average speed of recovery measured at the working load of the windlass (*see* 6.3).

3.3 Remote Control

A device for controlling the dropping of an anchor from the wheel-house.

4 TYPE

4.1 Type of machinery shall be as specified in **3.6** to **3.9** of IS 7937.

4.2 Type of Drive

The kind of drive required may be any of the following:

- a) Electric (E)
- b) Hydraulic (H)
- c) Diesel (D)
- d) Steam (S)
- e) Externally powered (EP)

5 DESIGN AND CONSTRUCTION

5.1 Chain Cable

Stud and stud-less chain cable conforming to IS 4692 or IS 4484 shall be considered for design of windlass.

5.2 Cable-Lifter

5.2.1 The cable-lifter shall have at least five snugs.

5.2.2 The cable-lifter shall be declutchable from the drive. Power operated clutches shall also be declutchable by hand.

5.2.3 The engagement angle of the chain cable on the cable-lifter shall be at least 117° for windlasses and 150° for anchor capstans.

5.3 Warping Ends

The windlass may be designed with or without warping ends. Warping ends may be fitted on an intermediate or on the cable-lifter shaft. The diameter of the warping ends shall be chosen depending on the power of the windlass.

5.4 Rope Drum

5.4.1 The mooring rope drum shall be declutchable from the drive.

5.4.2 The diameter of the drum shall be chosen depending on the power of the drive. The diameter of the drum shall be as agreed between the purchaser and the manufacturer but shall not be less than:

$$d_1 = d_2 \times 16$$

where

d_1 = Drum diameter, in mm; and

d_2 = Steel wire rope diameter, in mm.

5.5 Strength Requirements

The design and construction of the windlass shall comply with the following requirements for the strength of the machinery as a whole and by its elements:

- a) Chain cable stopper, if fitted, along with its attachments is to be designed to withstand, without any permanent deformation, 80 percent of the specified minimum breaking strength of the chain cable.
- b) If a cable stopper is fitted, the windlass with brakes engaged and cable-lifter disengaged shall withstand a pull of 45 percent of the breaking load of the chain cable without any permanent deformation of the stressed parts and without brake slip.
- c) If a cable stopper is not fitted, the windlass with brakes engaged and cable-lifter disengaged shall withstand a pull of 80 percent of the breaking load of the chain cable.
- d) The stresses on those parts of the windlass and the windlass frame concerned shall be below the elastic limit of the material used.

NOTES — Attention shall be paid to:

- 1 Stress concentrations in keyways and other stress raisers,
- 2 Dynamic effects due to sudden starting or stopping of the prime mover or chain cable;
- 3 Calculation methods and approximations used when deriving the design stresses, and
- 4 Requirements of the classification societies.

5.6 Braking System

5.6.1 Automatic Braking System

The windlasses shall be provided with an automatic brake system which operates when the control handle is in the 'off' position or when the power supply is cut off. The automatic brake system shall be capable of sustaining a load corresponding with the overload given in **6.5 (b)**.

5.6.2 Cable-Lifter Brake

Each cable-lifter shall be fitted with a hand-brake which may be remotely controlled, capable of applying a braking torque sufficient to maintain a load equal to the holding load given in **6.5 (c)**. The force on the handle of the hand-brake shall not exceed 150 N at the end of the handle.

5.7 Emergency Stop

5.7.1 Each windlass shall be fitted with a quick acting local emergency stop mechanism. When operated the stop mechanism will stop power to the windlass and applies the automatic brake-system.

5.7.2 The emergency stop mechanism shall be located in a clearly marked and accessible position close to the windlass.

5.8 Protection

The prime mover system of windlass shall be protected against excessive torque and shock.

5.9 Direction of Motion of the Operating Devices

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

6 PERFORMANCE

6.1 The performance requirements given in **6.5** are based on the use of one cable-lifter at a time.

6.2 The windlass shall be capable of continuous operation for a period of 30 min while exerting the working load and also be capable of exerting, for a period of at least 2 min at low speed, the overload pull stated in **6.5 (b)** with subsequent operation of at least 5 min at the nominal

load. The windlass drive shall be capable of creating a pull on the cable-lifter, at a motionless chain, equal to not less than the double nominal pull during 30 s.

6.3 The chain cable nominal speed shall be not less than 0.15 m/s.

6.4 The chain cable low speed shall be not more than 0.116 m/s.

6.5 The following values shall be used for determining performance data for a windlass:

- a) Requirements of statutory authorities and classification societies shall be taken into account in determining working load.
- b) Overload pull shall be equal to 1.5 times of the working load.
- c) Holding loads:
 - 1) With chain cable stopper, 0.45 times the breaking load of the cable; or
 - 2) Without chain cable stopper, 0.8 times the breaking load of the cable.
- d) Holding load of an automatic braking system shall be equal to 1.5 times the working load.

6.5.1 The performance data for windlasses is given in Table 1.

Table 1 Performance Data for Windlasses

Nominal Size mm	Chain Diameter mm	Duty Pull kN	Overload Pull kN	Roof Load* kN	Braking Load of Cable kN	Working Load Diameter mm
26	26	28.7	43.3	178.6	397	250
28	28	33.3	50.2	206.3	458	250
30	30	38.3	57.6	235.9	542	250
32	32	43.5	65.5	267.3	594	250
34	34	49.1	74.0	300.5	668	250
36	38	55.1	82.9	335.5	746	250
38	38	61.4	92.4	372.7	828	320
40	40	68.0	102.4	411.3	914	320
42	42	75.0	112.9	451.5	1 000	320

*The values are applicable to windlass.

7 TESTING

7.1 Acceptance Test

7.1.1 The following tests shall be carried out on each windlass or windlass unit. Where tests are required in excess of those listed below, they should be agreed between the purchaser and

the manufacturer at the time of contract. The place of all tests shall also be agreed between the purchaser and the manufacturer at the time of contract.

7.1.2 The windlass shall be run without load at a speed not less than nominal speed for 30 min, 15 min in each direction plus 5 min in each direction on each additional gear change as soon as possible after 30 min test.

While testing, the following shall be carried out:

- a) Check oil tightness,
- b) Measure temperature of bearings, and
- c) Note presence of abnormal noise and vibration.

7.1.3 The windlass shall be checked to verify that the working load, nominal speed and overload pull are attainable as specified in **6.3** and **6.5**.

While testing, the following shall be carried out:

- a) Check oil tightness,
- b) Measure temperature of bearings, and
- c) Note presence of abnormal noise and vibration.

7.1.4 The working and satisfactory operation of the cable-lifter brake should be tested to ensure compliance with the requirements of this Indian Standard [*see 5.5 (c) and 5.5 (d)*].

The holding power of the cable-lifter brake may be verified by test or calculated, as agreed to between purchaser and manufacturer.

The cable-lifter brake is also to be tested with the anchor dropping controlled and stopped by the brake.

7.1.5 Where remote controls or other special features are fitted, their satisfactory operation shall be verified.

7.2 Final Acceptance Tests

Final acceptance tests shall be carried out during the ship's anchor trials to verify satisfactory overall performance under service conditions. Special attention should be paid to proper bedding of the cable (and shackles if fitted) in the cable-lifters, oil tightness, temperature of bearings, absence of abnormal noise and vibration as well as the performance of special devices.

8 DESIGNATION

The designation of windlasses shall contain:

- a) Identification block (Windlass/ capstan)
- b) Type of machinery (*see 4*);
- c) Type of Drive (*see 4*)
- d) Nominal size (*see 3.2* of IS 7937);

- e) Control side (*R* for right-hand, *L* for left-hand and *C* for Central); and
- f) Reference to this Indian Standard.

NOTE — In the case where stud-less cables are used the letter ‘b’ shall be added to the designation of windlass.

Example

A double cable-lifter windlass with electric drive provided with a rope drum for 26 mm diameter, stud-less chain cable grade 1; left-hand control shall be designated as:

WINDLASS TYPE 1/ E/ 26/1/B/L IS 11474

9 MARKING

Each windlass or capstan shall be permanently marked with the following information:

- a) Reference to this Indian Standard
- b) Nominal size

10 BIS CERTIFICATION MARKING

The windlass or capstan may also be marked with the Standard Mark.

10.1 The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the BIS Act, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

11 SAMPLING

Unless otherwise agreed upon between a supplier and purchaser, the inspection sampling shall be as per IS 2500 (Part 1).

12 INFORMATION TO BE PROVIDED BY THE PURCHASER

The information to be provided by the purchaser shall be as given in Annex A.

ANNEX A
(Clause 12)

INFORMATION TO BE PROVIDED BY THE PURCHASER

A-1. The purchaser shall provide the manufacturers of the windlass with the following basic information:

- a) Windlass type;
- b) Kind of drive required (electric, hydraulic, diesel or external drive)
- c) Power supply (voltage, pressure, etc) as applicable;
- d) Nominal size (diameter and grade of chain and holding load of cable-lifter brake) as applicable;
- e) Whether left or right handed or symmetrical;
- f) Whether warping ends are required and where located;
- g) Relevant classification societies;
- h) Plan of the vessel showing the disposition of the windlass;
- j) Whether remote control is to be fitted; and
- k) Direction of rotation of anchor capstans when hoisting the anchor as viewed from above.