

अंतर्देशीय जहाजों के लिए पॉवर से चलने
वाले विंडलास और लगर चरखी —
सामान्य अपेक्षाएँ
(पहला पुनरीक्षण)

**Power Operated Windlasses and
Anchor Capstans for Inland
Vessels — General Requirements**
(*First Revision*)

ICS 47.060

© BIS 2024



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

FOREWORD

This Indian Standard (First Revision) was 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 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; and
- e) 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 in [Annex B](#).

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 a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard***POWER OPERATED WINDLASSES AND ANCHOR CAPSTANS
FOR INLAND VESSELS — GENERAL REQUIREMENTS***(First Revision)***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 standards given below 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 edition of these standards:

<i>IS No.</i>	<i>Title</i>
IS 4484 : 2013	Shipbuilding — Electrically welded stud link anchor chains and connecting shackles and swivels — Specification (<i>third revision</i>)
IS 4692 : 2013	Shipbuilding — Electrically welded studless link anchor chains and connecting shackles — Specification (<i>second revision</i>)
IS 7937 : 2012/ ISO 4568 : 2006	Shipbuilding — Sea-going vessels — Windlasses and anchor capstan (<i>third revision</i>)
IS 8650 : 2015	Shipbuilding and marine structures — Deck machinery — Vocabulary and symbols (<i>second revision</i>)

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

To access Indian Standards click on the link below:

https://www.services.bis.gov.in/php/BIS_2.0/bisconnect/knownyourstandards/Indian_standards/isdetails/

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; and
- d) The stresses on those parts of the windlass and the windlass frame concerned shall be below the elastic limit of the material used.

NOTE — 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; and
 - 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 workingload.

The performance data for windlasses is given in [Table 1](#).

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.

Table 1 Performance Data for Windlasses

(Clause [6.5](#))

SI No.	Nominal Size,	Chain Diameter,	Duty Pull,	Overload Pull,	Roof Load*,	Braking Load of Cable,	Working Load Diameter,
(1)	mm (2)	mm (3)	kN (4)	kN (5)	kN (6)	kN (7)	mm (8)
i)	26	26	28.7	43.3	178.6	397	250
ii)	28	28	33.3	50.2	206.3	458	250
iii)	30	30	38.3	57.6	235.9	542	250
iv)	32	32	43.5	65.5	267.3	594	250
v)	34	34	49.1	74.0	300.5	668	250
vi)	36	38	55.1	82.9	335.5	746	250
vii)	38	38	61.4	92.4	372.7	828	320
viii)	40	40	68.0	102.4	411.3	914	320
ix)	42	42	75.0	112.9	451.5	1 000	320

*The values are applicable to windlass.

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; and
- b) Nominal size.

10 BIS CERTIFICATION MARKING

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standard 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.

ANNEX B

(Foreword)

COMMITTEE COMPOSITION

Inland Harbour Craft and fishing Vessels Sectional Committee, TED 18

<i>Organization</i>	<i>Representative(s)</i>
Indian Register of Shipping, Mumbai	SHRI H. V. RAMESH (<i>Chairperson</i>)
American Bureau of Shipping, Mumbai	SHRI A. N. DAS SHRI ARNAB GHASH (<i>Alternate</i>)
Ashok Leyland Ltd, Mumbai	SHRI C. G. BELSARE SHRI SUMIT VYAS (<i>Alternate</i>)
Central Institute of Fisheries Nautical and Engineering Training, Kochi	SHRI SUNIL B. RANGARI
Central Institute of Fisheries Technology (ICAR), Kochi	DR LEELA EDWIN SHRI M. V. BAIJU (<i>Alternate</i>)
Chowgule and Co Pvt Ltd, Loutolim	SHRI P. CHAKRABARTY SHRI KHRISLER MASCARENHAS (<i>Alternate</i>)
Cochin University of Science and Technology, Department of Ship Technology, Cochin	DR K. SIVAPRASAD SHRI ANISHKUMAR M. N. (<i>Alternate</i>)
Cyriac Elias Voluntary Association (CEVA), Kochi	FR VARGHESE KOKKADAN DR ANTONY GREGORY (<i>Alternate</i>)
Delhi Earth Station Space Applications Centre, Department of Space, New Delhi	SHRIMATI SHAHANA K.
Directorate General of Quality Assurance, New Delhi	SHRI S. M. BHOSALE SHRI MONINDER PAL SINGH (<i>Alternate</i>)
Directorate General of Shipping, Mumbai	SHRI J. SENTHIL KUMAR SHRI GOPIKRISHNA C. (<i>Alternate</i>)
Directorate of Naval Architecture, Naval Headquarters, New Delhi	SHRI SUJIT BAXI SHRI PANKAJ GROVER (<i>Alternate</i>)
Directorate of Naval Design, Naval Headquarters, New Delhi	SHRI K. S. N. KUMAR
Dredging Corporation of India Limited, Visakhapatnam	PROF G. Y. V. VICTOR CAPT S. DIVAKAR (<i>Alternate</i>)
Fine Finish Organics Private Limited, Mumbai	SHRI G. S. PRABHU SHRIMATI KARISHMA PRABHU (<i>Alternate</i>)
Fishery Survey of India, Mumbai	SHRI SHAILENDRA KUMAR JAISWAL

<i>Organization</i>	<i>Representative(s)</i>
Goa Glass Fibre Limited, Colva	SHRI EMANI VENKATA RAMA KRISHNA SHRI NITIN PANDURANG SONAM (<i>Alternate</i>)
Goa Shipyard Limited, Vasco Da Gama	SHRI SANTOSH KUMAR SINGH SHRI DOMINIC CARDOSO (<i>Alternate</i>)
Indian Diesel Engine Manufacturers Association (IDEMA), New Delhi	SHRI ARVIND RANGANATHAN SHRI KARTHIK SARMA (<i>Alternate</i>)
Indian Institute of Technology Kharagpur, Kharagpur	SHRI VISHWANATH NAGARAJAN PROF O. P. SHA (<i>Alternate</i>)
Indian Institute of Technology Madras, Chennai	SHRI RAJIV SHARMA PROF S. K. BHATTACHARYA (<i>Alternate</i>)
Indian Maritime University, Visakhapatnam	SHRI SHEEJA JANARDHANAN SHRI G. V. V. PAVAN KUMAR (<i>Alternate</i>)
Indian Register of Shipping, Mumbai	SHRI S. RENGANATHAN
Inland Waterways Authority of Indian, Noida	SHRI S. V. K. REDDY
Institute of Marine Engineers India, Mumbai	SHRI SIVARAM NARAYANA SWAMI SHRI ANAND MOHAN MANI (<i>Alternate</i>)
Kerala Shipping and Inland Navigation Corporation Ltd, Kochi	SHRI K. K. ABDUL GAFFOOR SHRI K. R. ANOOP KUMAR
Kolkata Port Trust, Kolkata	CAPT A. K. BAGCHI
Lloyd's Register Asia, Mumbai	SHRI C. R. DASH SHRI SRIKANTH SARIPAKA (<i>Alternate</i>)
Mazagon Dock Ltd, Mumbai	SHRI BIJU GEORGE SHRI MANOJ R. PAI (<i>Alternate</i>)
Ministry of Ports, Shipping and Waterways, New Delhi	SHRI ANIL PRUTHI SHRI RAMJI SINGH (<i>Alternate</i>)
Raksha Polycos Pvt Ltd, Pune	SHRI ABHIJIT SARKAR SHRI ABHIJIT ANDURKAR (<i>Alternate</i>)
Saertex India Pvt Ltd, Pune	SHRIMATI DEEPA S. SHRI MILIND PANDE (<i>Alternate</i>)
Shipyards Association of India, New Delhi	SHRI P. R. GOVIL
Shoft Shipyard Private Limited, Thane	SHRI BINOD KUMAR SAH SHRI P. GANESH KUMAR (<i>Alternate</i>)
Timblo Drydocks Pvt Ltd, Margao	CDR SUBHASH MUTREJA CDR RAJU GANAPATHY (<i>Alternate</i>)
Titagarh Wagons Limited, Kolkata	SHRI VINEET SHRIVASTAVA

<i>Organization</i>	<i>Representative(s)</i>
Vedam Design and Technical Consultancy Pvt Ltd, Mumbai	SHRI PARITOSH BARUI
In Personal Capacity [A-1201, Raheja Sherwood, Near HUB Mail W. Exp. Highway, Goregaon (East), Mumbai – 400063]	SHRI S. M. RAI
BIS Directorate General	SHRI P. V. SRIKANTH, SCIENTIST ‘D’/ JOINT DIRECTOR AND HEAD (TRANSPORT ENGINEERING) [REPRESENTING DIRECTOR GENERAL (<i>Ex-officio</i>)]

Member Secretary
SHRI SHARAD KUMAR
SCIENTIST ‘D’/JOINT DIRECTOR
(TRANSPORT ENGINEERING), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 2016* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: TED 18 (21120).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 2323 0131, 2323 3375, 2323 9402

Website: www.bis.gov.in

Regional Offices:

Central : 601/A, Konnectus Tower -1, 6th Floor,
DMRC Building, Bhavbhuti Marg, New
Delhi 110002

Telephones

{ 2323 7617

Eastern : 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V,
Salt Lake, Kolkata, West Bengal 700091

{ 2367 0012
2320 9474

Northern : Plot No. 4-A, Sector 27-B, Madhya Marg,
Chandigarh 160019

{ 265 9930

Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113

{ 2254 1442
2254 1216

Western : 5th Floor/MTNL CETTM, Technology Street, Hiranandani Gardens, Powai
Mumbai 400076

{ 25700030
25702715

Branches : AHMEDABAD, BENGALURU, BHOPAL, BHUBANESHWAR, CHANDIGARH, CHENNAI, COIMBATORE, DEHRADUN, DELHI, FARIDABAD, GHAZIABAD, GUWAHATI, HARYANA (CHANDIGARH), HUBLI, HYDERABAD, JAIPUR, JAMMU, JAMSHEDPUR, KOCHI, KOLKATA, LUCKNOW, MADURAI, MUMBAI, NAGPUR, NOIDA, PARWANOO, PATNA, PUNE, RAIPUR, RAJKOT, SURAT, VIJAYAWADA.