भारतीय मानक **IS 9936 : 2023**

Indian Standard

वस्त्रादि — समुंद्रीय उद्देश्य के लिए मनीला, नायलॉन, पॉलिएस्टर और पॉलीप्रोपाइलीन रस्सियाँ — तुल्यता के लिए मार्गदर्शक

(दूसरा पुनरीक्षण)

Textiles — Manila, Nylon, Polyester and Polypropylene Ropes for Marine Purpose — Guide on Equivalence

(Second Revision)

ICS 59.080.50

भारतीय मानक ब्यूरो
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February 2023 **Price Group 5**

Cordage Sectional Committee, TXD 09

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards after the draft was finalized by the Cordage Sectional Committee and approved by the Textiles Division Council.

Marine ropes have a wide variety of applications, including competitive yacht racing, leisure yacht sailing, dinghy sailing and mooring. They are designed to operate in wet conditions, so have very specific properties.

This Indian Standard was first published in 1981 and subsequently revised in 1992. This revision has been made in the light of experience gained since its publication and to incorporate the following major changes:

a) Values of linear density and respective breaking strength have been modified as per the latest version on IS 1084, IS 4572, IS 11066 and IS 5175; and

b) References to Indian standards have been updated.

In the preparation of this standard, considerable assistance has been derived from ISO 3505 : 1975 ‘Ropes and cordage — Equivalence between natural fibre ropes and man-made fibre ropes for use in the mooring of vessels’.

The following main factors have been taken into account while formulating this standard:

a) If a man-made fibre rope is used in place of a natural fibre rope of equivalent strength it would be much smaller in diameter and could, bv virtue of its smaller cross-sectional area lose a higher proportion of its strength due to the external abrasion, chafing cuts and other forms of surface damage which occur during use;

b) The use of deck equipment not specifically designed for man-made fibre ropes could result in the possibility of excessive wear and breakage;

c) Internal abrasion between the strands of the rope may be caused by the characteristically high extension of man-made fibre ropes under load, and the corresponding recovery;

d) Some man-made fibre ropes are vulnerable to melting due to frictional heat;

e) Most man-made fibres lose strength while in hot conditions, and of the ropes quoted in the Indian Standard, this particularly applies to polyolefins. Much depends, however, on the relationship between the operating temperature and the melting point of the material;

f) In the case of polyamide ropes, there is some loss of strength on wetting;

g) All textile fibres lose strength on exposure to sunlight. The effect depends on the type of fibre, the cross-sectional area of the rope, the geographical location of use, the time of exposure, and the amount and type of stabilizer used;

h) In the event of rope breakage, the energy released causes high re-coil speeds which can be dangerous to personnel; and

j) Due to the hysteresis effect, all ropes suffer a reduction in their energy absorption once the rope has been in use.

The composition of the committee responsible for the formulation of this standard is listed in Annex B.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’.

Indian Standard

TEXTILES — MANILA, NYLON, POLYESTER AND POLYPROPYLENE ROPES FOR MARINE PURPOSE — GUIDE ON EQUIVALENCE

(Second Revision)

1 SCOPE

This standard prescribes requirements of polyamide (nylon), polyester and polypropylene ropes equivalent to different manila ropes for use in mooring of ships.

2 REFERENCES

The standards listed in Annex A 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 in Annex A.

3 EQUIVALENCE

3.1 The polyamide, polyester and polypropylene ropes recommended as equivalent to 3-strand manila ropes conforming to Grade 1 of IS 1084 for mooring of ships are specified in Table 1 and Table 2.

3.1.1 For ready reference, the linear densities and breaking strengths for different ropes are reproduced from the related standards in Table 3.

Table 1 Physical Properties of Man-Made Fibres
(*Clause* 3.1)

Sl No.	Physical Property	Polyamide (Nylon) Multifilament	Polyester Multifilament	Polyethylene Monofilament	Polypropylene		
					Multifilament	Monofilament	Fibrillated film
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Texture	Soft and Silky	Soft and Silky	Wiry like Bristle	Soft and Silky	Wiry like Bristle	Harsh like Straw
ii)	Finish	Bright lusture	Bright lusture	Surface smooth	Bright lusture	Surface smooth	Surface smooth
iii)	Cross-sectional shape	Circular	Circular	Circular	Circular	Circular	Tape
iv)	Specific gravity	1.14	1.38	0.95	0.91	0.91	0.91
v)	Melting point, °C	250	260	135	165	165	165
vi)	Moisture regain, percent	4.0	0.4	Less than 0.01	0.1	0.1	0.1
vii)	Tenacity, g/denier	Over 8.8	Over 6.0	Over 5.5	Over 8.0	Over 5.0	Over 4.5

Table 2 Equivalence Between Manila and Man-Made Fibre Ropes
(*Clause* 3.1)

Sl No.	Manila Rope (3-Strand Hawser Laid) Conforming to Grade 1 of IS 1084 Dia, *mm* (or Reference Number)	Polyamide Rope (3-Strand Hawser Laid) Conforming to IS 4572 Dia, *mm* (or Reference Number)	Polyester Rope (3-Strand Hawser Laid) Conforming to IS 11066 Dia, *mm* (or Reference Number)	Polypropylene Rope (3-Strand Hawser Laid or 8-Strand Plaited) Conforming to IS 5175 Dia, *mm* (or Reference Number)
(1)	(2)	(3)	(4)	(5)
i)	52	44	44	44
ii)	56	48	48	48
iii)	60	52	52	52
iv)	64	56	56	56
v)	68	60	64	64
vi)	72	64	72	72
vii)	76	72	80	80
viii)	80	80	88	88

Table 3 Linear Densities and Breaking Strength of Rope
(*Clause* 3.1.1)

Sl No.	Manila Rope (3-Strand Hawser Laid) (in accordance with Grade I of IS 1084)		Polyamide Rope (3-Strand Hawser Laid) (in accordance with IS 4572)		Polyester Rope (3-Strand Hawser Laid) (in accordance with IS 11066)		Split/Mono/Multi PP2 Rope (3-Strand Hawser Laid) (in accordance with IS 5175)	
	Linear Density kTex (g/m) ± 5 percent	Breaking Strength, *Min* kN	Linear Density kTex (g/m) ± 5 percent	Unspliced Breaking Strength, *Min* kN	Linear Density kTex (g/m) ± 5 percent	Unspliced Breaking Strength, *Min* kN	Linear Density kTex (g/m) ± 5 percent	Unspliced Breaking Strength, *Min* kN
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
i)	1 950	195.59	1 190	355	1 470	280	875	250
ii)	2 150	223.54	1 420	400	1 750	335	1 040	280
iii)	2 480	249.09	1 670	475	2 050	375	1 220	335
iv)	2 960	284.40	1 930	560	2 380	425	1 420	375
v)	3 180	313.82	2 220	630	2 730	500	1 630	425
vi)	3 620	351.08	2 530	710	3 110	560	1 850	500
vii)	4 000	387.37	3 200	900	3 930	710	2 340	600
viii)	4 400	426.60	3 950	1 060	4 850	850	2 890	750
ix)	5 600	500.15	4 780	1 320	5 870	1 060	3 500	900
x)	6 400	588.41	5 690	1 500	6 990	1 250	4 170	1 060

NOTE — 1 kN = 102 kgf approximately

ANNEX A
(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
IS 1084 : 2005	Textiles — Manila ropes — Specification (*fifth revision*)
IS 4572 : 2022	Fibre ropes — Polyamide 3-, 4-, 8- and 12- Strand ropes (*fifth revision*)
IS 5175 : 2022	Polypropylene split film, monofilament and multifilament (PP2) and polypropylene high-tenacity multifilament (PP3) — 3-, 4-, 8- and 12- strand ropes (*fourth revision*)
IS 11066 : 2022	Fibre ropes — Polyester 3-, 4-, 8- and 12- strand ropes (*third revision*)

ANNEX B
(*Foreword*)

COMMITTEE COMPOSITION
Cordage Sectional Committee, TXD 09

Organization	*Representative(s)*
Indian Institute of Technology Delhi, New Delhi	DR (PROF) R. CHATTOPADHYAY (***Chairperson***)
Association of Synthetic Fibre Industries, New Delhi	DR M. S. VERMA
Azuka Synthetics LLP, Panchkula	SHRI SUSHANT GUPTA SHRI DEVRAJ THAKUR (*Alternate*)
Central Coir Research Institute, Kochi	SHRIMATI SUMI SEBASTIAN DR ANITA JACOB (*Alternate*)
Central Ordnance Depot, Kanpur	REPRESENTATIVE
Chhotanagpur Rope Works Private Limited, Ranchi	SHRI SIDDHARTH JHAWAR SHRI ANURAG JHAWAR (*Alternate*)
Coast Guard Headquarters, New Delhi	CMDT NUPUR KULSHRESTHA SHRI D. D. SHARMA (*Alternate*)
Crown Industries, Kolkata	SHRI SANJEEV AGARWAL SHRI GH BHUNIA (*Alternate*)
Delta Ropes Manufacturing Company, Kolkata	SHRI ANAND MAJARIA SHRI AAYUSH MAJARIA (*Alternate*)
Directorate of Quality Assurance (DGQA) (Naval), Delhi	CAPT A. K. SHARMA SHRI G. S. N. MURTHY (*Alternate*)
Directorate of Quality Assurance (DGQA), New Delhi	SHRI K. I. SINGH
Garware Technical Fibres Limited, Pune	SHRI KISHOR J. DARDA SHRI SATISH J. CHITNIS (*Alternate*)
Indian Jute Industries Research Association, Kolkata	MS SOUMIATA CHOWDHURY SHRI PARTH SANYAL (*Alternate*)
Indian Jute Mills Association, Kolkata	SHRI SAMIR KUMAR CHANDRA SHRI BHUDIPTA SAHA (*Alternate*)
Jayshree Fibre Products Limited, Kolkata	SHRI N. K. SOMANI SHRI MANOJ BIYANI (*Alternate*)
Kohinoor Ropes Pvt Ltd, Aurangabad	SHRI VINAY CHANDAK SHRI SUNIL BIHANI (*Alternate*)
National Institute of Natural Fibre Engineering and Technology (ICAR-NINFET), Kolkata	SHRI SURAJIT SENGUPTA SHRI KARTICK SAMANTA (*Alternate*)
Office of the Jute Commissioner, Kolkata	SHRI SOUMYADIPTA DATTA SHRI P. K. BISWAS (*Alternate*)

Organization	*Representative(s)*
Office of the Textile Commissioner, Mumbai	SHRI N. K. SINGH SHRI HUMAYUN K. (*Alternate*)
Oil and Natural Gas Commission (ONGC), Mumbai	REPRESENTATIVE
Oil India Limited (OIL), Assam	REPRESENTATIVE
Protherm Engineering Pvt Ltd, Faridabad	SHRI RATNESH DEWAN SHRI SANJEEV KUMAR SHARMA (*Alternate*)
Reliance Industries Limited, Mumbai	SHRI RAJIV GUPTA SHRI KESHAV PAREEK (*Alternate*)
Shipping Corporation of India Limited, Mumbai	CAPT YOGESH PURI
Thanawala and Company, Mumbai	SHRI HEMAL M. THANAWALA SHRI VIVAAN THANAWALA (*Alternate*)
Tufropes Private Limited, Silvassa	SHRI ANURAG SARIN SHRI SHASHI BHUSHAN NEGI (*Alternate*)
BIS Directorate General	SHRI J. K. GUPTA, SCIENTIST 'E'/DIRECTOR AND HEAD (TEXTILES) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
SHRI ASHWANI KUMAR
SCIENTIST 'B'/ASSISTANT DIRECTOR
(TEXTILES), BIS

Bureau of Indian Standards

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