IS : 1084 : 2005

(Reaffirmed 2016)
(Reaffirmed 2021)

भारतीय मानक

वस्त्रादि — मनीला रस्सियाँ — विशिष्टि

(पाँचवाँ पुनरीक्षण)

Indian Standard

TEXTILES — MANILA ROPES — SPECIFICATION

(Fifth Revision)

ICS 59.080.50

B U R E A U O F I N D I A N S T A N D A R D S
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

May 2005

Price Group 4

Cordage Sectional Committee, TX 09

FOREWORD

This Indian Standard (Fifth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Cordage Sectional Committee had been approved by the Textile Division Council.

This standard was originally published in 1957 and subsequently revised in 1961, 1969, 1983 and 1994. In this standard opportunity has been availed to align it with corresponding International Standard, ISO 1181 : 1990 'Ropes — Manila and sisal — Specification'. This standard has been made in the light of the experience gained and to incorporate the following major changes:

a) Scope has been modified,

b) Grades have been reduced to 2,

c) Manufacturing method of yarn has been redefined,

d) Safe working load has been included, and

e) Quantity of rot proofing agent has been specified.

The composition of the Committee responsible for 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 : I960 '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.

Indian Standard

TEXTILES — MANILA ROPES — SPECIFICATION

(Fifth Revision)

1 SCOPE

This standard prescribes the requirements of the following types of electromechanically made manila ropes:

a) Hawser-laid manila ropes of diameter 6 mm to 128 mm and with linear density from 32 to 11 380 ktex.

b) Shroud-laid manila ropes of diameter 8 mm to 128 mm and with linear density from 54 to 11 380 ktex.

c) Cable-laid manila ropes of diameter 40 to 144 mm and with a linear density from 1 030 to 13 105 ktex.

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 TERMINOLOGY

For the purpose of this standard, the definition given in IS 3871 shall apply.

4 GRADING

The ropes shall be graded as Grade 1 and Grade 2 on the basis of breaking strength.

5 ATMOSPHERIC CONDITIONS FOR CONDITIONING AND TESTING

The tests shall normally be carried out under prevailing atmospheric conditions. In case of dispute, however, tests shall be carried out on samples which have been conditioned for 24 h in an atmosphere at 65 ± 2 percent relative humidity and 27 ± 2°C temperature (*see* IS 6359). Where practicable, tests shall be carried out in the standard atmosphere. Alternatively the tests shall be carried out as quickly as possible but not later than 15 min of removal of the tests pieces from the conditioning atmosphere.

6 MANUFACTURE

6.1 Manila Fibre

The fibre used in the manufacture of ropes shall be manila, that is, Abaca (*musa textiles*) true to its type and shall be unadulterated and free from defects and shorts. The fibre shall be well hackled and of quality, fineness and colour necessary to produce ropes having the characteristics required and specified in Tables 1 to 3.

6.2 Yarn

The evenly spun 4.6 ktex yarn throughout the length processed on hard fibre processing plant shall be used for manufacture of the ropes. Hard fibre processing plant constitutes of goods/spreader machine finisher/ drawing machine and spinning machine. Hand hackled or hand spun yarn shall not be used. Minimum number of yarns per strand shall be as specified in Tables 1 to 3.

6.3 Strand

The strands of rope shall be well formed and free from grooves and sunken yarns. Each strand shall contain an equal number of yarns and shall not contain splices or joints. The strands shall have 'S' lay.

6.4 Ropes

The ropes shall be well-laid and free from defects and each coil shall be continuous throughout its length and shall not contain loose ends, splices or joints in the strands or in the rope. The number of strands in the rope and the lay of rope, unless otherwise specified, shall be as under:

Sl No.	*Type of Rope*	*No. of Strands*	*Lay of Rope*
(1)	(2)	(3)	(4)
i)	Howser-laid	3	Z
ii)	Shroud-laid	4	Z
iii)	Cable-laid	9 (with 3 primary ropes twisted together)	Z-lay for primary ropes, and S-lay for final rope

6.4.1 The angle of lay for all types of ropes shall be 37°

6.5 Lubrication

Weighing or loading materials shall not be used. For the purpose of dressing the fibre or for the preservation of the rope, a lubricant shall be added preferably petroleum products. The quantity of dressing applied to the fibre shall be neither less than 10 percent nor more than 15 percent calculated on the mass of the finished rope when determined by extraction with petroleum ether or other solvent.

6.6 Rot-Proofing Treatment

If so ordered, ropes shall be rots proofed by the application of suitable rot-proofing agent in appropriate quantity to protect the rope from fungus and microbial attack. The rot-proofing agent may be applied in the fibre at the dressing stage for uniform penetration in the rope. Ropes, which have been so treated shall otherwise comply, in all respects, with the requirements of this standard. When zinc and copper are extracted in accordance with IS 3522 (Part 1), it shall be minimum 0.5 percent and 0.2 percent respectively.

7 SAFE WORKING LOAD

7.1 Recommended Safe Working Load

For ropes employed for lifting purposes, a ratio of minimum breaking load to maximum working load of the rope of not less than 6 is recommended as a factor of safety. The factor of safety should be considered together with the purpose for which the rope is used, the conditions of service and the condition of ropes. While 8 is recommended as a minimum for new ropes used under the most favourable conditions, it is in most cases desirable to increase this factor to a minimum of 8 to 10 for rope slings in order to make arbitrary allowances for unavoidable increase of stress at bight and where the rope passes around the body of the crane hook etc.

Where conditions are adverse and warrant such a course being taken, it may be desirable to adopt more conservative values than those recommended above.

It should be appreciated that because of such influences as frictional resistance and dynamic effect and (in the case of slings) the loss of strength of the rope at any acute bends, the numerical value of the true facts of safety will be less than the numerical values recommended above.

Ropes are liable for wear and tear and can be weakened by various agencies like chemicals, heat, light, and wind. Weather, etc, therefore, regular inspection is necessary to ensure that the rope is still serviceable for the particular use. The decision whether to continue to use a rope or replace it should be based on an assessment of the general conditions of the rope and also environmental working conditions like hazardous work, constant starching under heavy load surging or sudden jerks under heavy stress, that is in excess of safe working load as specified above.

8 REQUIREMENTS

8.1 Mass of the Coil

The net mass of the coil shall be determined in accordance with IS 7071 (Part 2). The difference between the observed mass and the calculated value of mass obtained by multiplying nominal linear density of the rope with the length of rope in the coil shall be within limits specified below:

Reference No. of Rope	*Tolerance, Percent*
(1)	(2)
Up to 8	± 10
10 to 14	± 8
above 14	± 5

8.2 Pitch

The pitch of rope, when determined in accordance with IS 7071 (Parts 1 to 3) shall conform to the following requirements:

Sl No.	*Type of Rope*	*Pitch*
(1)	(2)	(3)
i)	Hawser-laid	shall be between 2.5 *D* to 3.5 *D*
ii)	Shroud-laid sisal rope	shall be between 2.7 *D* to 4.5 *D*
iii)	Cable-laid sisal rope	shall be between 2.2 *D* to 3.2 *D*

where *D* is the diameter of the rope.

8.3 Length of Coil

The length of each coil when tested as per IS 7071 (Parts 1 to 3) shall not be less than 220 m or as declared. However, if so agreed between the buyer and the seller, the length of coil may be tested under zero tension and ± 5 percent tolerance shall be applicable for the rope with diameters less than or equal to 14 and ± 3 percent with a diameter greater than 14 on the specified/declared length.

NOTE — Any coil which has been shortened by cutting from it the necessary test sample shall be accepted at its original length, provided that the test sample complies with the specified requirements.

8.4 Diameter

The diameter of the rope shall not be less than that specified in Tables 1 to 3 and shall not exceed by more than the following tolerances:

Sl No.	*Diameter* mm	*Tolerance* mm
(1)	(2)	(3)
i)	Under 24	± 1
ii)	24 and under 48	± 2
iii)	48 and under 64	± 3
iv)	64 and under 96	± 4
v)	96 and above	± 5

8.5 Other Requirements

The hawser-laid, shroud-laid and cable-laid manila ropes shall conform to the requirements given in Tables 1, 2 and 3 respectively.

9 FINISH

Unless specially required by the purchaser, no colouring agent, except of the rot-proofing agent shall be used. All ends shall be securely whipped or marled.

10 IDENTIFICATION

10.1 If agreed to between the buyer and the seller, manila ropes shall be marked for identification of grade in accordance with the procedure laid down in IS 9560.

10.1.1 The marker yarns shall take the place of one of the white yarns. Jute yarn provided it is not coarser than 1 654 tex (48 grist) may be used but it shall not be taken as a substitute for one of the white yarns in the strand and shall be additional.

11 PACKING

Unless otherwise specified, ropes shall be packed as specified in IS 3256.

12 MARKING

12.1 Each coil shall have labels at both ends securely attached on which the following shall be marked:

a) Indication of the source of manufacture;
b) Length of rope in the coil;
c) Diameter, in mm;
d) Month and year of manufacture;
e) Grade; and
f) Any other marking, required by the buyer.

12.2 BIS Certification Marking

Each coil may also be marked with the Standard Mark.

12.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act,* 1986 and Rules and Regulations made thereunder. The details of the conditions under which a license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

13 SAMPLING AND CRITERIA FOR CONFOR-MITY

13.1 Lot

The quantity of coils of rope of the same linear density, type and dimensions, manufactured under similar conditions and delivered to a buyer against one dispatch note shall constitute a lot.

13.2 The conformity of the lot shall be determined on the basis of the tests carried out on the samples selected from it.

13.3 Sampling shall be as representative as possible of the lot. Draw the samples at random at the rate shown by the following formula:

$$S = \sqrt{0.4\,N}$$

where S is the number of coils in the sample and N is the size of the lot expressed, as number of coils. When S as calculated is not a whole number, round off the value obtained to give a whole number in accordance with the requirements of IS 2. In case where S is less than one drawn a sample coil.

13.4 For evaluating the length, linear density, breaking strength and pitch, the number of coils selected according to **13.3,** shall constitute the test sample.

13.4.1 For evaluating the net mass of the lot, all the coils into the lot shall constitute the test sample.

13.5 Criteria for Conformity

The lot shall be declared conforming to this standard, if following conditions are satisfied:

a) Length of each coil satisfies the specified declared length;
b) All the individual test samples tested for breaking strength satisfy the specified breaking strength. However, in case of failure of the test specimen drawn from a coil, another specimen shall be retested from the same coil and the same shall satisfy the specified requirement; and
c) Average values of the test results of the lot in respect of other characteristics conform to the specified requirements.

Table 1 Requirements of Manila Ropes Hawser-Laid (3-Strands)

(*Clauses* 6.1, 6.2, 8.4 *and* 8.5)

Diameter	No. of Yarns per Strand	Linear Density	Tensile Force to be Applied for the Measurement of Linear Density	Breaking Strength, *Min*	
				Grade 1	Grade 2
mm	*Min*	ktex (g/m)	N (kgf)	kN (kgf)	kN (kgf)
(1)	(2)	(3)	(4)	(5)	(6)
6	2	32	68.65(7)	2.94(303)	2.55(260)
8	3	54	107.84(11)	5.45(556)	4.73(482)
10	4	68	137.25(14)	7.04(718)	6.23(635)
12	6	105	205.88(21)	10.64(1 085)	9.37(955)
14	8	140	284.31(29)	14.50(1 479)	12.60(1 285)
16	10	190	401.96(41)	20.30(2 070)	17.70(1 805)
18	13	220	480.39(49)	24.40(2 488)	20.94(2 135)
20	16	275	637.25(65)	32.40(3 304)	27.90(2 845)
22	19	330	754.90(77)	38.59(3 935)	33.39(3 405)
24	23	400	892.16(91)	45.70(4 660)	39.23(4 000)
26	27	470	1 049.02(107)	53.35(5 440)	46.34(4 725)
28	31	532	1 196.08(122)	60.94(6 214)	52.22(5 325)
30	36	625	1343.14(137)	68.59(6 994)	59.77(6 095)
32	43	740	1 539.22(157)	78.75(8 030)	68.65(7 000)
36	52	890	1911.76(195)	96.50(9 840)	84.68(8 635)
40	64	1 100	2 343.14(239)	119.60(12 196)	102.14(10 415)
44	81	1 400	2 784.31(284)	142.24(14 504)	123.57(12 600)
48	96	1 660	3 284.31(335)	167.64(17 094)	145.14(14 800)
52	113	1 950	3 833.33(391)	195.59(19 944)	169.66(17 300)
56	125	2 150	4 382.35(447)	223.54(22 794)	194.32(19 814)
60	144	2 480	4 980.39(508)	249.09(25 400)	221.68(22 605)
64	171	2 960	5 686.27(580)	284.40(29 000)	250.07(25 500)
68	185	3 180	6 215.69(634)	313.82(32 000)	279.49(28 500)
72	207	3 620	6 960.78(710)	351.08(35 875)	320.68(32 700)
76	231	4 000	7 549.02(770)	387.37(39 500)	343.24(35 000)
80	253	4 400	8 215.69(838)	426.60(46 060)	379.52(38 700)
88	323	5 600	9 705.88(990)	500.15(51 000)	460.92(47 000)
96	364	6 400	11 000.00(1 122)	588.41(60 000)	524.66(53 500)
104	427	7 500	13 441.00(1 371)	717.02(73 115)	640.20(65 281)
112	496	8 715	15 481.00(1 579)	826.91(84 320)	737.26(75 178)
120	569	9 970	17 784.00(1 814)	948.70(96 739)	847.07(86 376)
128	643	11 380	20 177.00(2 058)	1010.32(1 03 022)	900.79(91 855)
Tolerance	—	—	—	—	—
Method of Test, IS 7071 (Part 3)	—	IS 7071 (Part 2)	—	IS 7071 (Part 4)	

NOTES

1 IN = 0.102 kgf (approximately).

2 1 kN = 101.97 kgf (approximately).

3 Tolerance on linear density for diameter up to 8 is ± 10 percent, for diameter 10 to 14 is ± 8 percent and for diameter above 14 is ± 5 percent.

Table 2 Requirements of Manila Ropes Shroud-Laid (4-Strands)

(*Clauses* 6.1, 6.2, 8.4 *and* 8.5)

Diameter	No. of Yarns per Strand	Linear Density	Tensile Force to be Applied for the Measurement of Linear Density	Breaking Strength, *Min*	
				Grade 1	Grade 2
mm	*Min*	ktex (g/m)	N (kgf)	kN (kgf)	kN (kgf)
(1)	(2)	(3)	(4)	(5)	(6)
8	2	54	98.84(10)	4.81(490)	4.27(435)
10	3	68	127.45(13)	6.27(639)	5.59(570)
12	4	105	186.27(19)	9.41(960)	8.43(860)
14	5	140	254.90(26)	12.80(1 305)	11.33(1 155)
16	7	190	352.94(36)	17.90(1 825)	15.94(1 625)
18	9	220	421.57(43)	21.53(2 195)	18.83(1 920)
20	13	275	568.63(58)	28.68(2 924)	25.11(2 560)
22	15	330	676.47(69)	34.08(3 067)	30.06(3 065)
24	18	400	803.92(82)	40.36(4 116)	35.89(3 660)
26	21	470	941.18(96)	47.07(4 800)	41.68(4 250)
28	24	532	1 078.43(110)	53.79(5 485)	46.97(4 790)
30	28	625	1 205.88(123)	60.56(6 175)	53.79(5 485)
32	35	700	1 392.16(142)	69.53(7 090)	60.65(6 184)
36	43	890	1 705.88(174)	85.17(8 685)	76.01(7 751)
40	52	1 100	2 107.84(215)	105.37(10 745)	91.94(9 375)
44	62	1 340	2 509.80(226)	125.53(12 800)	112.09(11 430)
48	73	1 585	3 049.02(311)	147.98(15 090)	130.04(13 260)
52	84	1 870	3 450.98(352)	172.60(17 600)	152.50(15 550)
56	97	2 150	3 941.18(402)	197.31(20 120)	174.90(17 835)
60	111	2 480	4 480.39(457)	219.28(22 360)	199.52(20 345)
64	135	2 880	5 117.65(522)	255.96(26 100)	226.83(23 130)
68	140	3 180	5 647.06(576)	282.44(28 800)	251 54(25 650)
72	156	3 620	6 313.73(644)	315.98(32 220)	288.61(29 430)
76	171	4 000	6 970.59(711)	348.63(35 550)	308.91(31 500)
80	206	4 400	7 646.47(780)	383.94(39 150)	341.57(34 830)
88	246	5 350	9 000.00(918)	450.13(45 900)	413.06(42 120)
96	288	6 400	10 588.24(1 080)	529.57(54 000)	472.20(48 150)
104	335	7 500	12 923.66(1 318)	646.18(65 891)	576.18(48 556)
112	384	8715	14 883.13(1 518)	744.15(75 881)	663.54(67 661)
120	450	9 970	16 875.35(1 721)	845.76(86 242)	752.36(76 718)
128	569	11 380	18 184.36(1 855)	909.21(92 712)	810.72(82 669)
Tolerance	—	—	—	—	—
Method of Test, IS 7071 (Part 3)	—	IS 7071 (Part 2)	—	IS 7071 (Part 4)	

NOTES

1 1 N = 0.102 kgf (approximately).

2 1 kN = 101.97 kgf (approximately).

3 Tolerance on linear density for diameter up to 8 is ± 10 percent, for diameter 10 to 14 is ± 8 percent and for diameter above 14 is ± 5 percent.

Table 3 Requirements of Manila Ropes Cable-Laid (9-Strands)

(*Clauses* 6.1, 6.2, 8.4 *and* 8.5)

Diameter	No. of Yarns per Strand	Linear Density	Tensile Force to be Applied for the Measurement of Linear Density	Breaking Strength, *Min*	
				Grade 1	Grade 2
mm	*Min*	ktex (g/m)	N (kgf)	kN (kgf)	kN (kgf)
(1)	(2)	(3)	(4)	(5)	(6)
40	17	1 030	1 450.98(148)	72.77(7 420)	64.72(6 599)
44	20	1 215	1 725.94(176)	86.20(8 790)	76.69(7 820)
48	24	1 455	2 019.61(206)	101.01(10 300)	89.63(9 140)
52	28	1 625	2 313.73(236)	115.72(11 800)	102.97(10 500)
56	33	2 005	2 647.06(270)	132.39(13 500)	117.68(12 000)
64	43	2 605	3 352.94(342)	167.70(17 100)	149.06(15 200)
72	54	3 230	4 137.25(422)	206.92(21 100)	184.37(18 800)
80	67	4 065	5 019.61(512)	251.05(25 600)	223.60(22 800)
88	81	4 915	6 000.00(612)	300.09(30 600)	266.75(27 200)
96	96	5 825	7 058.82(720)	353.05(36 000)	313.82(32 000)
104	113	6 860	8 215.69(838)	410.91(41 900)	364.81(37 200)
112	131	7 900	9 490.20(968)	474.65(48 400)	421.69(43 000)
120	150	9 105	10 823.53(1 104)	541.34(55 200)	480.53(49 000)
128	171	10 375	12 274.51(1 252)	613.91(62 600)	539.37(55 000)
136	193	11 705	13 784.31(1 406)	689.42(70 300)	612.43(62 450)
144	216	13 105	15 352.94(1 566)	767.87(78 300)	687.46(70 100)
Tolerance	—	± 5 percent	—	—	—
Method of Test, IS 7071 (Part 3)	—	IS 7071 (Part 2)	—	IS 7071 (Part 4)	

NOTES

1 1 N = 0.102 kgf (approximately).

2 1 kN = 101.97 kgf (approximately).

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
2 : 1960	Rules for rounding off numerical values *(revised)*
3256 : 1980	Code for inland packaging or ropes and cordages (*first revision*)
3522 (Part 1): 1989	Methods for estimation of common preservatives on textiles: Part 1 (*first revision*)
3871 : 1996	Textiles — Fibre ropes and cordage —Glossary of terms (*second revision*)
4145 : 1987	Code of practice for storage of ropes (*first revision*)
4575 : 1983	Code of handling of fibre ropes (*second revision*)
6359 : 1971	Method for conditioning of textiles
7071 (Parts 1 to 3): 1989	Ropes and cordages — Methods of physical test (*first revision*)
7071 (Part 4) : 1986	Methods of physical test for ropes and cordages: Part 4 Breaking load and elongation at break
9560 : 1980	Colour code for identification of ropes and cordages
9944 : 1992	Natural and man-made fibre rope slings — Recommendations on safe working loads (*first revision*)

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Cordage Sectional Committee, TX 09

Organization	*Representative (s)*
Jayashree Fibre Products, Kolkata	SHRI N. K. SOMANI (*Chairman*)
Balaji Ropes Manufacturcring Co Pvt Ltd, Kolkata	SHRI ANAND MAJARIA
	SHRI SANDEEP AGARWAL (*Alternate*)
Calcutta Port Trust, Kolkata	SHRI P. L. NAG
	SHRI S. K. CHATTERJEE (*Alternate*)
Coir Board, Alleppey	SHRI P. T. JOSEPH
	SHRI K. G. RAGHAVAN (*Alternate*)
Chhotanagpur Rope Works Pvt Ltd, Ranchi	SHRI SIDHARTH JHAWAR
	SHRI ANURAG JHAWAR (*Alternate*)
Garware-Wall Ropes Ltd, Pune	SHRI M. P. MONE
	SHRI S. J. CHITNIS (*Alternate*)
Indian Institute of Technology, New Delhi	DR R. CHATTOPADHYAY
Indian Jute Industries' Research Association, Kolkata	DR D. SUR
	DR A. K. MUKHOPADHYAY (*Alternate*)
Jayashree Fibre Products, Kolkata	SHRI M. K. BIYANI
Minsitry of Defence (DGQA), New Delhi	SHRI GAUTAM GUPTA
	SHRI G. C. SHUKLA (*Alternate*)
Ministry of Defence (DGQA Naval), New Delhi	SHRI LAXMAN SINGH
	SHRI K. N. SAHU (*Alternate*)
Office of the Jute Commissioner, Kolkata	INDUSTRIAL ADVISOR
	ASSISTANT DIRECTOR (JM) (*Alternate*)
Office of the fextile Commissioner, Mumbai	SHRI S.P. CHAKRABORTY
Shipping Corporation of India Ltd, Mumbai	SHRI D. K. RAY
	SHRI G. SHARMA (*Alternate*)
Thanawala & Co, Mumbai	SHRI KANTILAL G. THANAWALA
	SHRI HEMAL M. THANAWALA (*Alternate*)
United Rope Works, Kolkata	SHRI S.N. AGARWAL
	SHRI U. K. AGARWAL (*Alternate*)
BIS Directorate General	SHRI M. S. VERMA, Director and Head (TXD) [Representing Director General (*Ex-officio*)]

Member Secretary
SHRI B. L. BHARATI
Joint Director (TXD), BIS

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

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 latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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