



DRAFT TANZANIA STANDARD

**Textiles – Ropes Specifications– Part 1–Ropes made from natural fibres
(Revision of TZS 492-1:2019)**

Draft Standard For Public Comments

TANZANIA BUREAU OF STANDARDS

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National Foreword

This Tanzania Standard was published under the authority of the Board of Director of Tanzania Bureau of Standards.

Tanzania Bureau of Standards (TBS) is the statutory national standards body for Tanzania established by the Standards Act Cap. 130.

Tanzania Standards are developed through Technical Committees that are representative of key stakeholders, including government, academia, consumer groups, private sector and other interested parties.

The Technical Committees work under the supervision of Divisional (sectoral) Committees. The Standards are developed in accordance with the Guide and Procedure for Development of Tanzania Standards and TZS 0, Guide for presentation of Tanzania Standards.

Tanzania Standards are subject to review, to keep pace with science and technological advances. Users of the Tanzania Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

This Tanzania Standard was developed under the supervision of the Textile Divisional Standards Committee (TDC). The Technical Committee responsible for the standard is (TDC 8- Yarns and Twines)

This third edition cancels and replaces the second edition (TZS 492-1 2019), which has been technically revised

The reporting of the results of a test or analysis made in accordance with this Tanzania Standard, if the final value, observed or calculated is to be rounded off, shall be done in accordance with TZS 4.

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1. Scope

This Draft Tanzania Standard describes the requirements of the following types of sisal and manila ropes.

- a) Plain or hawser-laid (3-strands) ropes of diameter 8 to 96mm and with a linear density from 54 to 6400 kilotex,
- b) Plaited or shroud-laid (4-strand) ropes of diameter 8 to 96mm and with a linear density from 54 to 6400 kilotex and
- c) Cable-laid (9-strand) ropes of diameter 40 to 144mm and with a linear density from 1030 to 113105 kilotex.

2. Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies:

- a) TZS 3: Atmospheric conditions for testing.
- b) TZS 4: Rounding off numerical values.

3. Terms and definitions

For the purpose of this document, the following terms and definitions shall apply;

3.1

hawser-laid rope

rope in which three strands are twisted together without a central core, it is generally of Z-lay.

3.2

shroud-laid rope

four strand ropes in which the strands are twisted together with a central core of the basic yarns of which the strands are made.

3.3

cable laid rope

nine strand ropes in which three primaries (hawser-laid) ropes are twisted together without a central core.

3.4

linear densities

mass per unit length of textile products such as ropes, lines, cords and twines. In the universal count system, it is expressed in kilotex.

3.5

rot-proofing

chemical treatments given to natural fibre ropes for protection against microbiological attack and destructive agencies such as sunlight and sea water

3.6

coil

continuous length of rope or line arranged in the form of a spiral.

3.7

pitch (of rope)

distance between two successive spirals of the same strand of a rope measured parallel to the axis of the rope.

3.8

rope

cordage with a circumference of 25mm or more.

3.9

laying

twisting of strands to form a rope (See Figure 1)

4. MANUFACTURE

4.1 Sisal fibre – the fibres used in the manufacture of ropes shall be sisal, true to its type and shall be of long staple it shall be unaltered 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, 2, 3, 4 and 5.

4.2 Manila fibre – fibres used in the manufacture of ropes shall be from manila, true to its type and shall be of long staple, it shall be unaltered and free from defects and shorts.

4.3 Yarn – the yarn shall be well and evenly spun. To comply with the minimum number of yarns specified in this standard, yarn of 4.6 kilotex (216m/kg) shall be used.

4.4 Strand – the strand of ropes shall be well formed and free from grooves and sunken yarns, and each strand shall contain an equal number of yarns. The number of yarns in each strand shall be as specified in the table 1, 2, 3, 4 and 5. The strand shall have S-lay.

4.5 Ropes – The ropes shall be well laid and free from defects and each package shall be continuous throughout its length and shall not contain loose ends, splices or joins in the strands or in the ropes.

The number of strands in the rope and the lay of rope and the lay of rope, unless otherwise specified, shall be as under:

Type of rope	No of strands	lay of rope
a) Plain or hawser-laid Manila and sisal rope	3	Z (See figure 2)
b) Plaited or shroud-laid Manila and sisal rope	4	Z (See figure 3)
c) Cable-laid sisal rope	9 (with 3 primary ropes twisted together) (see Figure 4)	Z – lay for primary rope and S-lay for final rope

4.6 Lubrication – 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. The quantity of dressing applied to the fibre shall, when determined by extraction with petroleum either or other suitable solvent, be not less than 10%, nor more than 15% calculated on the mass of the finished rope.

4.7 Rot-proofing treatment – If so ordered, ropes shall be rot-proofed by application of rot-proofing agent in appropriate quantity as agreed to between the buyer and the seller. The rot-proofing agent may be used in places of, or in conjunction with, the lubricant (see 4.5) normally used for the purpose of dressing the fibre. Ropes which have been so treated shall otherwise comply, in all respects, with the requirements of this Tanzania Standard.

5. General requirements

5.1 Manila and sisal ropes shall be made in one of the following constructions as illustrated in the figures 1, 2, 3 and 4.

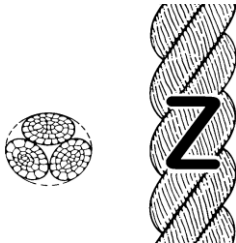


Figure 1 – Shape of a 3-strand hawser-laid rope (type A)

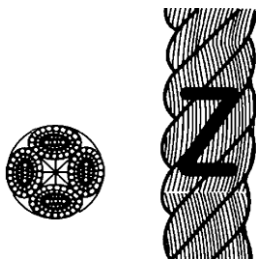


Figure 2 – Shape of a 4-strand shroud-laid rope (type B)



Figure 3 – Shape of an 8-strand braided rope (type C)

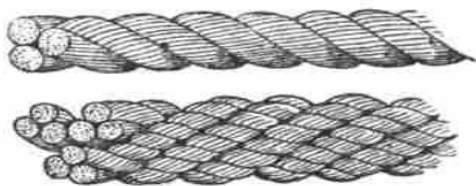


Figure 4 – Cable-laid sisal (9-strands) rope

5.2 The direction of the rope shall be made in one of the following direction lay:



5A Z – lay or right – hand lay



5B S – lay or left – hand lay

Figure 5 – Direction of lay

6. OTHER REQUIREMENTS

6.1 Mass – The gross mass of a lot of ropes when determined according to the method given in A-1 shall be as agreed to between the buyer and the seller, or as entered in the dispatch note subject to a tolerance of $\pm 3.5\%$. The mass of the packing material should not be more than 1.5% of the gross mass of ropes.

6.2 Pitch – The pitch of rope, when determined by the method given in A.2, shall conform to the following requirements:

Type of rope	Pitch
a. Plain or hawser-laid rope	Shall be between 2.5 D and 3.3 D
b. Plaited or shroud-laid rope	Shall be between 2.7 and 3.5 D
c. Cable-laid rope	Shall be between 2.2 D and 3.2 D

Where

D is the diameter of the rope concerned.

6.3 Length of packages – The length of each package shall be 220m unless otherwise agreed to between the buyer and the seller and the length of package shall be determined by the method given in A-3.1.

7. 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 (secured).

8. GRADES OF ROPE

Manila and Sisal ropes complying with the requirements of this Tanzania Standard (2nd edition) shall be of the standard quality.

9. PHYSICAL PROPERTIES

Linear density and minimum breaking force shall conform to Tables 1, 2, 3, 4 and 5.

TABLE 1 – Requirements of sisal ropes – Plain or Hawser – laid (3-strands)

Angle of lay 37°C

Diameter (mm)	Minimum No. of yarns per strand	Linear density		Tensile force to be applied for the measurement of linear density (daN)	Minimum breaking Load (kN)
		(Ktex)	Tolerance %		
8	3	54	±5	11	4.71
10	4	68		14	6.23
12	6	105		21	9.32
14	8	140		28	12.56
16	10	190		40	17.46
18	13	220		48	20.89
20	16	275		64	27.86
22	19	330		75	33.35
24	23	400		89	39.83
26	27	470		105	46.30
28	31	532		120	52.29
30	36	625		134	59.84
32	41	700		154	67.30
36	52	890		189	84.76
40	64	1100		234	102.02
44	77	1340		279	124.59
48	92	1585		329	144.21
52	108	1870		383	169.47
56	125	2150		438	194.38
60	144	2480		498	221.75
64	164	2880		569	252.12
68	185	3180		622	279.58
72	207	3620		696	320.79
76	231	4000		755	343.35
80	253	4400		822	379.65
88	306	5350		971	459.11
96	364	6400		1101	524.83
Method of test	-	A-3		-	A -4

TABLE 2 – Requirements of sisal ropes – plaited or shroud – laid (4-strands)

Diameter (mm)	Minimum No. of yarns per strand	Linear density		Tensile force to be applied for the measurement of linear density (daN)	Minimum breaking Load (kN)
		(Ktex)	Tolerance %		
8	2	54	±5	10	4.27
10	3	68		13	5.59
12	4	105		19	8.44
14	5	140		25	11.33
16	7	190		35	15.94
18	9	220		42	18.83
20	11	275		57	25.11
22	13	330		68	30.07
24	15	400		80	35.98
26	18	470		94	41.79
28	21	532		108	46.99
30	24	625		121	53.81
32	28	700		139	60.58
36	35	890		171	86.03
40	43	1100		211	91.97
44	52	1340		251	112.13
48	62	1585		305	130.08
52	73	1870		345	152.54
56	84	2150		394	174.96
60	97	2480		448	199.58
64	111	2880		512	226.90
68	125	3180		565	251.63
72	140	3620		632	288.71
76	156	4000		697	309.01
80	171	4400		768	341.68
88	206	5350		900	413.20
96	246	6400		1059	472.35
Method of test	-	A-3		-	A-4

TABLE 3 – Requirements of cable - laid sisal ropes (9-strands).

Angle of lay 37°

Length of coil: 220m

Diameter (mm)	Minimum No. of yarns per strands	Linear density		Tensile force to be applied for measurement of linear density (daN)	Minimum breaking load (kN)
		(Ktex)	Tolerance %		
40	17	1030	±5	129	64.75
44	20	1215		153	76.71
48	24	1455		179	89.66
52	28	1695		206	103.00
56	33	2005		235	117.72
64	43	2605		298	149.11
72	54	3230		369	184.43
80	67	4065		447	223.67
88	81	4915		534	266.83
96	96	5825		628	313.92
104	113	6860		730	364.93
112	131	7900		844	421.83
120	150	9105		961	480.69
128	171	10375		1091	545.44
136	193	11705		1226	613.12
144	216	13105	1375	687.68	
Method of test	-	A-3		-	A-4

Table 4 – Requirements of 3-strand hawser laid and 4-strand shroud laid Manila ropes, type A and B.

Nominal diameter (mm)	Linear density		Minimum breaking load (kN)
	(Ktex)	Tolerance %	
4	10	±10	1.15
4.5	12		1.45
5	15		1.89
6	20		2.40
8	38		4.50
10	64	±8	6.75
12	90		9.60
14	130		12.5
16	165	±5	17.6
18	218		22.0
20	260		27.0
22	320		33.8
24	380		39.6
26	445		46.6
28	515		55.0
30	600		63.4
32	680		71.0
36	850		90.5
40	1050		110
44	1200		131
48	1400		158
52	1720		184
56	2050		205
60	2250		245
64	2750		270
68	3000		300
Method of test	A-3		A-4

Table 5 – Requirements of 8 - strand braided Manila ropes, type C.

Nominal diameter (mm)	Linear density		Minimum breaking load (kN)
	(Ktex)	Tolerance %	
16	165	±5	17.4
18	219		21.9
20	265		25.7
22	327		31.5
24	380		38.8
26	450		45.9
28	520		53.6
30	600		61.3
32	685		70.0
36	880		88.9
40	1000		104
44	1150		128
48	1480		145
52	1700		175
56	2000		202
60	2200		240
64	2650		260
68	3000		300
72	3400		329
76	3800		383
80	4200		407
84	4600		445
88	5000		500
92	5600		564
96	6000		599
Method of test	A-3		A-4

10. PACKING

Ropes shall be securely packed in a suitable material to prevent damage during transportation and storage.

11. MARKING

11.1 Each individual marking shall be marked with following information:

- a) name of the material and construction,
- b) Length and Size of the Ropes in the coil.
- c) Net weight,
- d) Colour
- e) Country of origin
- f) Name and/ or address of the manufacturer
- g) Month and year of manufacture.

11.2 Each package containing Ropes shall be marked with following information:

- a) Name of the material and construction,
- b) Net weight,
- c) Gross weight,
- d) Country of origin
- e) Name and/ or address of the manufacturer
- f) Month and year of manufacture.
- g) Length and size of the rope in the Coil

5 Sampling

The sampling criteria shall be in accordance with ISO 2859-1.

Annex A (Normative)

A – 1 Mass

A – 1.1 Without removing the wrapping material, weigh each package in the lot to the nearest 0.5kg and determine the total gross mass of the entire package in the lot.

A – 1.2 For the purposes of determining the length of the package, calculate the net mass of each coil constituting the test sample, (for purposes of 12.4) by removing the wrapping material and then weighing the coil.

A – 2 Pitches of rope

Take each package in the sample and apply an appropriate tension as specified in the Table 1, 2 and 3. In plane parallel to the axis of the rope, place two "pitch marks" on two successive spirals of the same strand of the rope and measure the distance between the two points. While the ropes are still under tension, measure the diameter with the help of a Vernier caliper to the following accuracy.

Diameter of rope	Measurement accuracy
Up to 96mm	1mm
Above 96mm	5mm

A – 3 Linear density

A - 3.1 Length of coil – From one end of one of the coils in the sample, cut off a test specimen exactly 2m (l) in the length after applying tension by hand. Weigh the specimen in grams (m). Mark a length of 1m (d_1) in the center of the specimen. Apply an appropriate tension as specified in Tables 1, 2 and 3. While rope is still under tension, measure to the nearest mm the distance d_2 between the marks.

A – 3.2 Calculate the length the linear density T by the following formula:

$$T = \frac{m \times d_1}{l \times d_2}$$

Where

T – linear density in kilotex or g/m

m – mass of the test piece in g

d_1 – distance between the marks (1m)

l – length of the test specimen (2m) and

d_2 – distance between the marks under tension in meters

A - 3.3 Calculate the length of the coil by dividing the net weight of the coil as obtained in A - 1.2 by the linear density of the corresponding coil obtained in A - 3.2

A - 4 Breaking load

A – 4.1 Apparatus – Rope tensile testing machine of appropriate capacity with constant rate of traverse of the straining head of not less than 150mm/ minute.

A-4.2.1 With ordinary grips - Mount each specimen with an initial length of not less than one meter between the grips of the testing machine. Apply gradually and continuously increasing load until the specimen breaks. If fractures occur at or near the grips at less than the specified breaking load, disregard the test and take a further test. Accept the test results corresponding to any specimen without fractures through causes attributable to grip damage as meeting the requirements of the specification provided that the load recorded is not less than 95% of the minimum specified breaking load.

NOTE – When agreed to between the buyer and seller, ropes with the ends "eye – spliced" may be used for the tests in which case the rope will be deemed to comply with the requirements of this specification provided that the breaking load obtained from the specimen is a minimum of 90 percent of the specified breaking load given in Tables 1, 2 and 3 and provided that the fractures occurs at the splice.

A-4.2.2 With bollard grips – small size ropes may be tested on testing machine with bollard grips. In such cases mount the test specimen with an initial length of not less than 250mm between the bollards of the testing machine ensuring that the rate of transverse of the straining load for constant rate of transverse machine is as near as possible numerically equal in mm per minute to the length of specimen. Apply gradually and continuously increasing load until the specimen breaks. If fracture occurs at or near the grips at less than the specified breaking load, disregard the test and take a further test. Accept the test results corresponding to any specimen that fractures through causes attributable to grip damage as meeting the requirements of this specification provided that the load recorded is not less than 95 percent of the minimum specified breaking load (see also Note under A-4

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