



DRAFT TANZANIA STANDARD

Textiles – Ropes Specifications: Part 2. Ropes made from Man-made fibres (Revision of TZS 492-2:2019)

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 492-2: 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.

Draft Standard for Public Comments

1. Scope

This Draft Tanzania Standard describes materials, manufacturing and performance requirements of manmade ropes made of Polyester, Polyamide (Nylon), Polypropylene and Polyethylene for general use.

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

braid

rope or textile structure formed by a braiding process, intertwining of strands in a braiding process to produce a rope structure

3.2

cordage

collective terms for twines, cords and rope made from textile fibers and yarns.

3.3

strand

largest individual element used in the final rope making process and obtained by joining and twisting together several yarns or groups of yarns.

3.4

rope fiber

compact but flexible, torsionally balanced structure produced from strands which are laid, plaited or braided together to produce a product which serves to transmit a tensile force between two points. Generally greater than 4mm diameter

3.5

laid rope

rope made by twisting three or more strands together with a twist direction opposite to that of the strands

3.6

plaited rope

8-strand rope consisting of two pairs of strands twisted to the right and two pairs of strands twisted to the left and plaited together such that the pairs of strands of opposite twist alternately overlay one another

3.7

hawser-laid rope –

made up of three strands, it is the fibre (or yarns) of which have been twisted together in a left-handed direction, these three strands are then twisted together in a right-handed direction to make on a rope.

3.8

shroud-laid rope

made of four strands laid right-handed on a core of rope.

4. MATERIALS

- 4.1** The fibres and yarns materials used in the manufacture of any given rope shall be of one generic type and under no circumstances shall any material other than that type of fibre be used.
- 4.2** The fibre ropes may be fabricated from continuous filament, heat and light resistant, industrial grade, having sufficient tenacity to meet this Tanzania Standard.
- 4.3** No extraneous materials shall be added for the purpose of weighting the rope. Extractable matter of the finished rope shall not exceed 2%.
- 4.4** Overlay finish: When specified, a marine overlay finish shall be applied to all yarns used in the manufacture of the rope. The overlay finish shall be extremely resistant to removal by water, and shall improve fiber to fiber abrasion resistance. The finish content of the yarn shall not exceed 5%.

5. MANUFACTURE

- 5.1** The ropes shall be 3-strand hawser-laid, 4-strand shroud, 8-strand plaited or 12-strand plaited construction, as illustrated in Figures 1, 2, 3 and 4.
 - 5.1.1** 3-strand hawser-laid rope shall be made with 3-strands, each strand having an identical structure and number of yarns. The strands shall be formed and the rope laid to produce a torque-balanced product.
 - 5.1.2** 4-strand shroud-laid rope shall be made of four strands laid right-handed on a core of rope.
 - 5.1.3** 8-strands plaited rope shall be made of 2 pairs of right-twisted strands and 2 pairs of left-twisted strands plaited together such that pairs of strands of the opposite twist alternately pass one over the other, with all strands having identical structure and the same number of yarns.
 - 5.1.4** 12-strands plaited rope may be made from three or more strands.
- 5.2** The mixing of fibre types and grades or fibers of different manufacturers shall not be permitted in the same rope.
- 5.3** The use of an internal marker or a surface yarn maker shall be the only exception to the strand-to-strand uniformity requirement.
- 5.4** Unless otherwise specified, the length of each finished fibre rope shall be continuous throughout its ordered length.
- 5.5** The finished rope shall meet or exceed all the requirements of this Draft Tanzania Standard and the applicable product standard.
- 5.6** The finished rope shall contain no cuts, kinks, soft spots, scratch or damaged sections, or broken, loose or projecting ends in the rope.



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

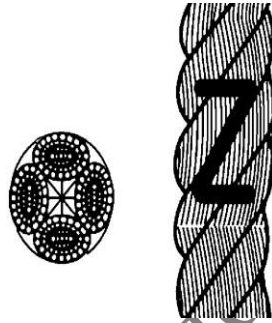


Figure 2 – Shape of a 4-strand shroud-laid rope (type B)



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



Figure 4 – Shape of a 12-strand braided rope (type D)

6. PERFORMANCE REQUIREMENTS

6.1 The performance requirements of the fibre ropes shall meet or exceed the requirements as listed in Tables 1, 2, 3, 4, 5, 6 and 7

6.2 When required, performance properties such as elasticity splice ability and hardness shall be included in the individual rope standard
Addition of test methods

Table 1 - Requirements of 3 strand hawsers laid and 4-strand shroud laid Polyester ropes, type A and B.

Nominal diameter (mm)	Linear density		Minimum breaking strength (kN)
	(Ktex)	Tolerance %	
4	11.5	±10	1.96
4.5	14.2		2.3
5	18.0		3.1
6	23.5		4.4
8	45.0		8.2
10	70.5	±8	13.0
12	100.0		18.1
14	140.5		25.0
16	180.5	±5	28.1
18	240.0		40.2
20	295.0		49.5
22	350.0		58.2
24	425.0		67.5
26	495.0		80.0
28	575.5		90.0
30	650.0		110.5
32	750.0		120.0
36	950.5		148.5
40	1145.0		190
44	1400.0		225
48	1650.0		270
52	1995.6		305
56	2150.0		344
60	2500.0		386
64	300.0		400

Table 2 - Requirements of 8 and 12-strand braided Polyester ropes, type C and D.

Nominal diameter (mm)	Linear density		Minimum breaking strength (kN)
	(Ktex)	Tolerance %	
12	100	±8	16
16	180	±5	28
20	280		45.6
24	400		70
28	500		90
30	580		105
32	670		124
36	850		148
40	1100		170
44	1300		250
48	1600		280
52	1800		350
56	2100		380
60	2500		430
64	2800		480
72	3600		550
80	4500		770
88	5500		850

Table 3 Requirements of 3 strand hawser laid and 4-strand shroud laid Polyamide (Nylon) ropes, type A and B.

Nominal diameter (mm)	Linear density		Minimum breaking strength (kN)
	(Ktex)	Tolerance (%)	
4	7.5	±10	1.7
4.5	9.15		2.3
5	12.5		3.7
6	15		5.4
8	27.0		9.0
10	50.0	±8	12.0
11	70.0		14.0
12	80		19.5
14	100		24.5
16	140		35.6
18	180	±5	48.0
20	220		55.0
22	250		68.0
24	330		83.5
26	380.5		100
28	450		115
30	500		125
32	600		145
36	750		180
40	900		230
44	1000		275
48	1200		300
52	1450		360
56	1700		400
60	2000		450

Table 4 Requirements of 8 and 12-strands braided Polyamide (Nylon) ropes, type C and D.

Nominal diameter (mm)	Linear density		Minimum breaking strength (kN)
	(Ktex)	Tolerance (%)	
8	48.0	±8	10
10	56		11
12	70.5		18
16	140	±5	30
20	218		48
24	335		70
28	445		110
32	580		166
36	700		190
40	900		210
44	990		260
48	1100		290
52	1400		350
56	1600		425
60	2000		470

Table 5 – Requirements of 3-strand hawser laid and 4-strand shroud laid Polypropylene ropes, type A and B.

Nominal diameter (mm)	Linear density		Minimum breaking strength (kN)
	(Ktex)	Tolerance (%)	
4	5.5	±10	1.8
4.5	8.0		2.2
5	9.0		3.0
6	14	±8	3.5
8	25		6.2
10	33		9.5
12	55		12.0
14	75	±5	19.5
16	100		24
18	125		34.8
20	165		40
22	190		50.5
24	230		60
26	285		70
28	345		81.5
30	380		91

Table 6 Requirements of 8 and 12-strand braided Polypropylene ropes, type C and D.

Nominal diameter (mm)	Linear density		Minimum breaking strength (kN)
	(Ktex)	Tolerance (%)	
8	35	±8	6.5
10	46		8.5
12	55		12.3
16	95	±5	23
20	175		35
24	230		48.5
28	330		78
32	420		95
36	500		115
40	650		150
44	760		185.5
48	980		240
52	1020		270
56	1200		290
60	1450		335

Table 7 - Requirements of 3-strand hawser laid and 4-strand shroud laid Polyethylene ropes, type A and B.

Nominal diameter (mm)	Linear Density		Minimum breaking strength (kN)
	(Ktex)	Tolerance (%)	
4	7.5	±10	1.2
4.5	8		1.8
5	10		2.0
6	15.5		2.5
8	27.0		4.5
10	45	±8	6.8
12	65		10.3
14	87		14.5
16	112	±5	20.0
18	150		24.6
20	185		30.0
22	220		38.0
24	260		44.4
26	300		54.0
28	350		60.0
30	425		70.3
32	480		84.5
36	600		100

7. PACKING, MARKING AND SAMPLING

7.1 Packing

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

7.2 Marking

Each individual marking shall be marked with following information:

- name of the material and construction,
- Length and Size of the Ropes in the coil.
- Net weight,
- Colour
- Country of origin
- Name and/ or address of the manufacturer
- Month and year of manufacture.

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

- Name of the material and construction,
- 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

8. SAMPLING

Sampling shall be conducted in accordance with ISO 2859-1

ANNEX

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 8.4) 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 d₁ –

distance between the marks (1m) l –

length of the test specimen (2m) and

d₂ – 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 - 3.2 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 metre 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 A4.2.1)