Draft
Tanzania Standard
Textiles – Twines – Specifications: Part 2. Twines made from man-made multifilament fibres.

(First edition)

TANZANIA BUREAU OF STANDARDS

0. FOREWORD

0.1 This Draft Tanzania Standard is being issued to set up performance specifications on Man-made multifilament fibre twines for different applications.

0.2 In the preparation of this Draft Tanzania Standard assistance was derived from

Local company specifications

International Bureau for the Standardization of Man-made Fibers (BISFA) - 2014

Tanzania Bureau of Standards
Draft Tanzania Standard TDC8 (5629)P_3
Textiles – Twines Specifications: Part 2.Twines made from man-made multifilament fibres.

1. SCOPE

This Draft Tanzania Standard describes materials; manufacturing and a performance requirement for man-made multifilament fibre twines for different applications.

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

3TZS 3: Atmospheric conditions for testing;

a) TZS 4: Rounding off numerical values.

3. TERMS AND DEFINITIONS

For the purpose of this Draft Tanzania Standard the following terms and definitions shall apply:

3.1 Breaking strength – nominal force (or load) expected to break or rupture a single specimen in a tensile test conducted under a specified procedure.

3.2 Decitex – mass of yarn in grams per 10,000 metre.

3.3 Linear density – mass per unit length of textile products such as ropes, cords and twines. In the universal count system, it is expressed in Tex or kilotex (see annex A).

3.4 Multifilament yarn – filament yarn consisting of many fine continuous filaments produced by the spinning of a polymeric material suitable for fiber production.

3.5 Tenacity – force divided by linear density of the unstrained specimen, the maximum specific stress that is developed in a tensile test to rupture.

3.6 Package – container, as a box or case, in which something is or may be packed in.

4. MATERIALS

4.1 Man-made multifilament fibre twines for all three types of materials mentioned above, shall be fabricated from continuous flat multifilament fibre of suitable strength to meet all the requirements of this Draft Tanzania Standard (see annex C).

4.2 No extraneous materials for all material shall be added for the purpose of weighting the multifilament fibre twines. Extractable matter of the finished multifilament fibre twine shall not exceed 5%.

5. REQUIREMENTS

5.1 Requirements of man-made multifilament fibres shall include the following as given in Tables 1, 2 and 3;

5.2 Linear density and runnage – They are subject to a tolerance of ±5% and shall be as described in annex A;

5.3 Minimum breaking force – Shall be as specified from Tables 1, 2 and 3 above. Any tolerance to be allowed shall be agreed between the purchaser and the supplier. Breaking force shall be determined as described in annex B;

5.4 Mass of package – A tolerance of +10%, -5% shall be allowed on the specific mass of any package provided that the variation from the gross specified mass of any delivery of one size and description does not exceed 5%;

5.5 Requirements beyond the scope of this Draft Tanzania Standard shall be established by a mutual agreement between the buyer and the seller.

Table 1: Performance requirements of Polyester fibre twine

Linear density (Dtex)	Number of Filaments	Breaking Strength *Min,* (N)	Tenacity (cN/Dtex)	Elongation at break %
145 – 222	45 – 48	10.0 – 18.0	5.5 – 6.5	15
235 – 470	48 – 96	19.0 – 38	6.5 – 7.0	16
550 – 930	96 – 192	45 – 60	7.0 – 7.5	13
1100	72 – 192	60 – 90	7.0 – 8.0	13
1440	192	115	8.2	13
1670	192-384	120	7	13
2200	384	162	7	13
3300	384	243	7.5	13

Table 2: Requirements of Polypropylene fibre twines

Linear density (Dtex)	Number of Filaments	Breaking Strength *Min,* (N)	Tenacity (cN/Dtex)	Elongation at break %
950	98	40	4.5	18
1100	110	60	5.5	20
1440	140	70	5.5	20
2200	230	120	6	20
3300	360	90	6	20

Table 3: Requirements of Polyamide (Nylon) fibre twine

Linear density (Dtex)	Number of Filaments	Breaking Strength *min,* (N)	Tenacity (cN/Dtex)	Elongation at break %
750	100	60	6.8	17
940	140	76	7.5	18
1440	192/210	117	7.8	20
1870	280	152	8.0	20
2100	300	170	8.0	20

Notes:

Converting Measurements of Tenacity

cN/dtex = g/den divided by 1.1325
cN/tex = g/den divided by 0.11325
g/dtex = g/den multiplied by 0.9
g/tex = g/den multiplied by 9

Table 4 – Conversion Formulas for the various numbering systems

Convert into known	tex	Decitex (dtex)	Denier (den)	Metric No. (Nm)	English Cotton No. (Ne)
tex		10 x tex	9 x tex	1000/tex	591/tex
Decitex (dtex)	Dtex/10		0.9 x dtex	10000/dtex	5910/dtex
Denier (den)	Den/9	Den/0.9		9000/den	5314/den
Metric No. (Nm)	1000/Nm	10000/Nm	9000/Nm		0.59 x Nm
English Cotton No. (Ne)	591/Ne	5910/Ne	5314/Ne	Ne x 1.69	

6. PACKING, PACKAGING AND MARKING

6.1 Packing

The identity of the material, quality and origin of multifilament fibre conforming to this Draft Tanzania Standard shall be marked alongside the package so as to remain visible during usage.

6.2 Packaging

6.2.1 The packaging unit may be a reel, a coil, a box or a bag or as specified by the purchaser.

6.2.2 The finished multifilament fibre shall be supplied in a package, so that it can be distributed freely without entanglement of any kind.

6.2.3 Either the unit mass or the length may be used to invoice the multifilament fibre. When the gross mass is used for invoicing, the mass of the packaging shall not exceed 1.5% of the gross mass of the multifilament fibre.

6.3 Marking

Each coil shall have a label securely attached on which shall be clearly and legibly marked the following:

a) constituent material;
b) identification of manufacturer and country of origin;
c) reference number and
d) delivered length.

7. SAMPLING

Sampling shall be as representative as possible of the batch that is to be subjected to the measurements and tests, and samples shall be selected away from the ends of the packages at points where they are in true lay.

7.1 Lot - A quantity of packages of the same linear density, same type, and same dimensions, manufactured under similar conditions and delivered to a buyer against a dispatch note shall constitute a lot.

7.2 The conformity of the lot shall be determined on the basis of test carried out on the same sample selected from it.

7.3 The number of package to be selected at random from a lot shall be as given in Table 5:

Table 5 – Sampling plan

Lot size	Sample size
0 to 10 packages	1
11 to 100packages	10
101 and above	100

7.4 For evaluating the length, linear density, breaking load and the number of packages selected according to 7.3 shall constitute the test sample.

For evaluating the gross mass of the lot all the package in the lot shall constitute the test sample.

7.5 Criteria for conformity – The lot shall be declared as conforming to this Draft Tanzania Standard if the conditions below are satisfied:

a. The length of each package is not less than the specified length and
b. The average values of the test results in respect of other requirements conform to the requirements specified in the standard.

ANNEX A

DETERMINATION OF LINEAR DENSITY

A-1 Principle

Weigh, under specified conditions, specimens of specified length, then followed by calculation of the linear density.

A-2 Apparatus

A-2.1 Balance, accurate to 0.5g.

A-2.2 Wrap – reel of known perimeter

A-3 Specimen

Selection

Select 10m (heavier twine) or 20m (lighter twine) from each package, proceeding in the following manner:

Directly from the center of each package, in an anti – clockwise direction, draw the first 10m of twine and discard them. Then draw 10m of twine (for 1000m/kg and heavier) or 20m of twine (for lighter than 1000m/kg) and wind them as adjacent turns (without overlapping) on the wrap – reel, exercising just sufficient tension on the twine to maintain straightness.

Each of 10m or 20m thus obtained constitutes a test piece.

A-4 Procedure

Weigh each specimen nearest to 0.5g (let *m,* be the mass obtained in grams).

A-5 Expression of results

A-5.1 Calculation of linear density

For each specimen; calculate the linear density *T,* in Tex, using the following formula:

$$T = \frac{1000m}{l}$$

Where

m, is the mass, in grams, of the specimen and

l, is the length, in meters of the specimen.

A-5.2 Calculation of runnage

Calculate the *runnage L,* in meters per kilogram of twine, using the following formula:

$$L = \frac{10^6}{\mathrm{T}}$$

Where *T,* is the linear density

ANNEX B
METHOD FOR DETERMINATION OF BREAKING LOAD

B-1 Apparatus

Use a power driven constant rate of extension or constant rate of traverse testing machine, which includes a pair of suitable devices to hold the specimen, a means of elongating the specimen at a suitable rate and a load – indicating mechanism to indicate or record continuously the load applied to the specimen.

The machine shall comply with the specified requirements for grade A machine, that is; the maximum permissible error shall not exceed 1% of the applied load or 0.2% of the maximum of the scale, whichever is the greater. Subject to agreement between the purchaser and the supplier a power-driven machine of the constant rate of loading type may be employed.

B-2 Specimens

Take ten or more than 10 specimens per sample length. The free length of the test specimen between the holding devices at the start of the test shall be 500mm.

B-3 Speed

The rate of traverse of the straining head of Constant rate of extension (*CRE)* and Constant rate traverse (*CRT)* machines shall be 500mm ± 50mm per minute.

If a Constant rate of loading (*CRL)* machine is used, the rate of loading shall be that the time to break is 60 ± 10 seconds.

B-4 Procedure

Insert the specimen carefully between the holding devices, set the machine in operation and increase the load continuously until the specimen breaks. Record the maximum load attained. Should any specimen slip in either of the holding devices or break in or at either of the holding devices at a load less than the appropriate minimum breaking load specified in the schedule, disregard the result and test a fresh specimen.

B-5 Results

Express the result for the breaking load of each specimen in N or Kg or decanewton (daN) to the nearest 1%

The SI unit for force is the newton (N). A load of 1kg = 0.981 decanewton (daN)

ANNEX C

METHODS FOR DETERMINATION OF NUMBER OF FILAMENTS

C-1 Apparatus

C-1.1 Microscope

C-1.2 Microscopic Slides

C-1.3 Glycerol/Water

C-1.4 Cutter & Measuring Scale

C-2 Principle

The specimens in the form of filament yarn are cuttings from different places so as to cover the entire surface in each direction/different cone. Mount those specimens on the microscopic slides using glycerol / Water.

C-3 Procedure

C-3.1 Take 5 specimens of yarn cuttings from separated different places so as to cover the entire surface in each direction/different cone.

C-3.2 Mount the specimens on the microscopic slides using glycerol and tease the strands so as to achieve maximum separation of all individual filaments.

C-3.3 Mount the slides on the microscope.

C-3.4 Count the individual number of filaments visually.

C-3.5 Write or note down the number of filaments on the work sheet.

C-3.6 Repeat the same process for all the specimens.

C-3.7 Then report the number of filaments average of five readings as the direction wise in case of fabric.