DRAFT TANZANIA STANDARD

Textiles - Universal system for designation of linear density

(Tex system)

TANZANIA BUREAU OF STANDARDS

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0 Foreword

0.1 It has long been customary to designate the coarseness or fineness of textile yarns by numbering or counting systems. Many branches of textile industry employ systems of their own for this and those in-current use may be classified in two groups:-

a) **direct systems,** in which the coarseness or the fineness of the yarn is expressed in terms of the mass of yarn per unit length (linear density, often called yarn number or yarn titre)

b) **indirect systems,** in which the coarseness or the fineness of the yarn is expressed in terms of the length of yarn per unit mass (usually called yarn count)

0.1.1 With the growing use of yarns containing more than one kind of fibre, and of fabrics containing these yarns, it became increasingly evident that the general adoption of a single system of numbering or counting would avoid confusion and save time.

0.2 In the preparation of this Draft Standard, assistance was derived from ISO 1144:2012 Textiles – Universal system for designation linear density (Tex System), published by the International Organization for Standardization.

1 Scope and field of application

1.1 This Draft Tanzania Standard gives the principles and recommended units of the Tex system of the expression of linear density and includes conversion table for calculating the tex values of numbers or counts in other systems together with a statement of the procedure for the implementation of the Tex system in trade and industry.

1.2 The Tex system is applicable to all kinds of textiles fibre, intermediate products (for example tops slivers and rovings), yarns and similar structures.

2 Characteristics of the system

2.1 This system, called the Tex system, is a direct system. It expresses the linear density, that is to say the mass of a certain length of the textile material.

2.2 The system is decimal and employs metric units.

2.3 The basic unit is the ‘‘tex’’ expresses the mass, in grams, of one kilometre of yarn.

2.3.1 It is realized that, at present, usage of the term linear density is limited to scientific and laboratory application but every effort should be made to ensure greater currency of it.

3 Units

3.1 The multiple and sub-multiples of the tex unit recommended for use in preference to other possible combinations are:-

a) Kilogram per kilometre, designated kilotex.

b) Decigram per kilometre, designated decitex

c) Milligram per kilometre, designated millitex.

Table 1 – Tex system (Recommended units)

Name	Symbol	Definition
Millitex	mtx	1 mtex = 1mg/km = µg/m
Decitex	dtex	1dtex = 1dg/km = 0.1mg/m
Tex	tex	1 tex = 1g/km = 1mg/m
Kilotex	ktex	1ktex = 1kg/km=1g/m

3.1.1 To indicate linear density in the Tex system as a quantity in formulae, table and printed forms, irrespective of units, the symbol Tt is used. It should never be used with a numerical value of linear density because it is not unit. It is equivalent in fact to the expression ‘‘Linear density expressed in the Tex system’’. In general formula, without a numerical value in which the linear density of a yarn (or other product) occurs, the symbol Tt’’ served to indicate that in a numerical application of the formula, this linear density is expressed in a unit of the Tex system.

4 Notation

4.1 The linear density in the Tex System is indicated by the numerical value followed by the name of the unit used.

Examples

100 mtex
60 dtex
20 tex
15 ktex.

ANNEX A – CONVERSION AND ROUNDING

A.1 Introduction

A.1.1 This Annex is intended to facilitate the implementation of the Tex System by describing the rational development of tex equivalents and giving on the choice of rounded tex values.

A.1.2 Three possibilities are given for the choice of tex equivalent:

a) Calculated tex equivalent

b) Rounded tex value

c) Recommended tex value

A.1.2.1 The recommended tex values are given in Table 5 will serve as guide and should be used whenever practicable.

A.2 Counts and numbers (titres), as expressed in other counting or numbering systems, and converted into tex values as set out below. The multiplying factors in Table 2 and the constants in Table 3 are expressed to four significant figures to give an accuracy of 0.05%.

A.2.2 The equivalent values, calculated to four significant figures, are rounded to three significant figures to obtain accuracy with 0.5% with respect to the value in the traditional systems.

A.2.3 Conversion from direct systems

A.2.3.1 In direct systems the coarseness or fineness of yarn (linear density) equals mass of yarn per unit of length.

A.2.3.2 Table 2 gives the multiplying factors for multiplying the known number (or titre)

Example

The equivalent of 840 denier in tex is: 840x0.1111= 93.32 or 933.2 dtex

Table 2 – Multiplying factors for direct systems

Yarn number	Symbolic abbreviation	Unit of mass used	Unit of length used	Unit of yarn number	Multiplying factor, yarn number to tex value
Tex	Tt	1 gram	1 kilometre	g/km	-
Denier	Td	1 gram	9000 metres	g/9000 m	0.1111
Linen dry spun, hemp, jute	Tj	1 pound	14400 yards (spindle unit)	lb/14400 yd	34.45
Woollen (aberden)	Ta	1 pound	14400 yards	lb/14400 yd	34.45
Woollen (Catalonian)	Tc_w	1 gram	504 metres	g/504 m	1.984

A.2.4 Conversion from indirect system

A.2.4.1 Indirect systems, coarseness or fineness of yarn equals length of yarn per unit of mass.

A.2.4.2 Table 3 gives the constants which are to be divided by the count in the indirect system.

Example: The equivalent of yarn count New 20 in tex is:

$$\frac{885.0}{20} = 44.29 \text{ tex}$$

= 44.3 tex to three significant figures
= 443 dtex

A.3 Choice or rounded tex value

A.3.1 When counts and numbers (titres) are converted into tex, decimal values are usually obtained, which may be used as they are or not rounded for practical purposes.

A.3.1.1 Where trade authorities concerned with each type of product have not published agreed lists in tex values of the yarns and fibres to be produced, the values in text to three significant figures obtained according to section A.2 and rounded using one of the alternatives given in A.3.2 may be used.

Example of the rounded values is given in Table 4.

A.3.2 For selecting rounded tex values; two possibilities are given;

a) rounding to the nearest two significant figures;

b) rounding in the direction of the recommended values of Table 5, using two significant figures or three significant figures when the last figure is 5. (see the example in a) and b) of column 3 in Table 4)

A.3.3 Care should be taken to ensure that rounding is applied consistently so that the rounded tex values for two traditional counts of which one is ten times the other should consist of the same digits and vary only in the position of the decimal point.

A.3.4 When rounded values are chosen, certain cases will arise where the difference between a yarn according to a traditional count and according to the value of the corresponding rounded tex value will be sufficient to necessitate some adjustment to the yarn being spun.

Table 3 – constants for conversion of indirect system

Yarn count system	Symbolic abbreviation	Unit of length used	Unit of mass used	Unit of yarn count	Constant for conversion to tex values
Asbestos (American)	Na_A	100 yards	1 pound	100 yd/lb	4961
Asbestos (English)	Ne_A	50 yards	1 pound	50 yd/lb	9921
Cotton bump yarn	N_B	1 yarn	1 pound	Yd/oz	31000
Cotton (English)	Ne_c	840 yards (hank)	1 pound	840 yd/lb	590.5
Glass (USA and UK)	N_G	100 yards	1 pound	100 yd/lb	4961
Linen (wet or dry spun)	Ne_L	300 yards	1 pound	300 yd/lb	1654
Metric	Nm	1 kilometre	1 kilogram	Km/kg	1000
Spun silk	N_s	840 yards	1 pound	840 yd/lb	590.5
Woollen (American cut)	Nac	300 yards	1 pound	300 yd/lb	1654
Woollen (American run)	Nar	100 yards	1 ounce	100 yd/oz	310
Woollen (west of English)	Nwe	320 yards (snap)	1 pound	320 yd/lb	1550
Woollen (Yorkshire)	Ny	256 yards (skein)	1 pound	256 yd/lb	1938
Worsted	Ne_w	560 yards (hank)	1 pound	560 yd/lb	885.8
Sisal (metric)	Nm_s	1 kilometre	1 kilogram	Km/kg	1000

Table 4 – Choice of rounded value

Traditional yarn count		Equivalent tex value in three figures	Rounded tex value		Recommended tex value according to table 5
System	Value		1) a	1) b	
Nm	15	66.7	67	67	68
Nm	30	33.3	33	33.5	34
Nm	60	16.7	17	17	17
Ne_c	12	49.2	49	49.5	50
Ne_c	24	24.6	25	25	25
Ne_c	48	12.3	12	12.5	12.5
Ne_c	120	4.92	5	4.9	5
Td	60	6.67	7	6.7	6.8
Td	120	13.3	13	13	13
Td	480	53.3	53	53	52
Td	600	66.7	67	67	68
Ne_w	18	49.2	49	49.5	50
Ny	24	80.7	81	80.5	80
Ne_l	25	66.1	66	66.5	68
NG	75	33.3	33	33.5	34
Na_A	75	33.3	33	33.5	34

1) See A.3.2

NOTE – This Table can be extended by including figures from lists published by accepted authorities.

A.4 Choice of recommended values

The decision to use recommended tex values may be taken before changing over to the Tex System or deferred until after the Tex System has come into use.

A.4.1 The use of recommended values is not obligatory; Table 5 is only intended to provide retinal system of selecting rounded values, based on a nearly equal increase of the linear density of yarns and with the addition objective of arriving in the future at a systematic reduction in the total range of linear density, the recommended values are silted in column 2 of Table 5. The range of exact values represented by each recommend values is also given in Table 5. The list of recommended values includes a minimum of decimals and uses even numbers as far as possible.

A.4.1.1 Use the following procedure to determine the recommended tex value corresponding to a yarn count or linear density expressed in any other system or corresponding with the roomed values of column 3 f Table 4.

A.4.2 Determine the calculated tex equivalent of the nominal count or number by means of the appropriate multiplying factor or constant given in Table 2 or 3.

Example 1: Nm 17 corresponds to 58.82 tex
Example 2: 1.5 denier corresponds to 166.7 mtex

A.4.3 Find the range of values in column 1 of table 5 which contains the tex value determined in accordance with A.3.2 or values already rounded, in accordance with A.3.2.

Example 1: 58.82 tex is contained in the range 58 to 62

Example 2: Multiplying by 10 the values in Table 5, 166.7 mtex is contained in the range 165 to 175 corresponding to the range 16.5 of 17.5 of the same Table.

A.4.4 Read off the recommended tex value given in column 2 of Table 5 for the range of values selected in accordance with A.4.3.

Example 1: For the range 58 to 62, the recommended tex value is 60

Example 2: For the range 165 to 175, the recommended tex value is 170 mtex (corresponding to 17 in Table 5.

A.4.4.1 The values in Table are valid for the tex and its multiples and sub – multiples, including kilotex, decitex and millitex units. The scope of the Table may be extended for coarser and finer values by multiplying or dividing the values given by 10 or 100.

Table 5 – Ranges of values of linear density in tex with their corresponding recommended tex values.

Value range		Recommended tex value
Over	Up to and including	
9.4	9.8	9.6
9.4	10.25	10
10.25	10.75	10.5
10.75	11.25	11
11.25	11.75	11.5
11.75	12.25	12
12.25	12.75	12.5
12.75	13.5	13
13.5	14.5	14
14.5	15.5	15
15.5	16.5	16
16.5	17.5	17
17.5	18.5	18
18.5	19.5	19
19.5	20.5	20
20.5	21.5	21
21.5	22.5	22
22.5	23.5	23
23.5	24.5	24
24.5	25.5	25
25.5	27	26
27	29	28
29	31	30
31	33	32
33	35	34
35	37	36
37	39	38
39	41	40
41	43	42
43	45	44
45	47	46
47	49	48
49	51	50
51	54	52
54	58	56
58	62	60
62	66	64
66	70	68
70	74	72
74	78	76
78	82	80
82	86	84
86	90	88
90	94	92
94	98	96
98	102.5	100
102.5	107.5	105

ANNEX B

IMPLEMENTATION OF THE TEX SYSTEM IN TRADE AND INDUSTRY

B.1 Introduction

B.1.1 This annex is intended to facilitate the implementation of the Tex System in trade and industry. For this purpose three stages may be used, but the several units or sections of industry are free to omit the first and/ or the second stage if they wish.

B.1.2 No procedure is given as obligatory for the kind of tex value to be used (equitant, rounded or recommended tex be used as is intended to be used in the third stage.

B.1.3 However, it is recommended that, in the first and second stages, the same numerical value for tex, mtex or ktex be used as is intended to be used in the third stage.

B.2 Preparatory steps

B.2.1 The trace authorities concerned with each type of product should as quickly as possible publish agreed lists in tex units of the yarns and fibres which are to be produced, and give some indication of the time-table for the adoption of the three stages. The tex values of these lists may be equivalent, rounded or recommended values.

B.3 First stage

B.3.1 While the Tables are being prepared and the existing yarn counting and numbering systems continue in use, the equivalent, rounded or recommended tex value (see B.2) is put in brackets after the count or number in the traditional system. The inclusion of the tex value does not affect commercial tolerances in any way, and every contract or commercial agreement will still refer to the count or number in the traditional system and not to the value in brackets. During this stage, the tex values will facilitate comparison of counts and linear densities designated in different systems.

Examples:	Ne_L 25 (68 tex)	Nm 4500 (220 mtex)
	Ne_W 18 (30.5 tex)	Td 840 (940 dtex)
	Ne_W 48 (18 tex)	Tj 192 (6.6 ktex)

B.4 Second stage

B.4.1 The tex value of linear density in tex is known first and the original nominal number or count is put in brackets after it.

B.4.2 If necessary, spinners will now adjust their production from the traditional counting system to the tex system in accordance with the appropriate list (see B.2)

Examples:	68 tex (Ne_L 25)	220 mtex (Nm 4500)
	30.5 tex (Ne_C 18)	940 dtex (Td 840)
	18 tex (Ne_W 48)	6.6 ktex (Tj 192)

B.5 Third stage

B.5.1 The designation in brackets is deleted and the tex System is the only system used.