This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: D2260 – 24

Standard Tables of Conversion Factors and Equivalent Yarn Numbers Measured in Various Numbering Systems[1]

This standard is issued under the fixed designation D2260; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These tables include (*1*) a series of conversion factors required to convert the number of a yarn measured in a specific system to the equivalent number measured in various other systems (see Table 1), and (2) specific equivalent numbers for yarns measured in various systems (see Table 2).

1.2 The content is basically consistent with recommendations of the International Organization for Standardization (ISO) Standard 2947.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D123 Terminology Relating to Textiles

D3823 Practice for Determining Ticket Numbers for Sewing Threads

D4849 Terminology Related to Yarns and Fibers

SI10 Standard for Use of the International System of Units (SI): The Modern Metric System[3]

2.2 *ISO Standard:*

Standard 2947 Textiles–Integrated Conversion Table for Replacing Traditional Yarn Numbers by Rounded Numbers in the Tex System[4]

2.3 *NIST Standard:*

NIST Circular M121, January 1936[5]

3. Terminology

3.1 Refer to Terminology D4849 for definition of the following terms used in this standard: Americal grain count; cotton count; cut, *in asbestos and glass yarns*, cut, *in wool yarns*; denier; direct yarn numbering systems; grain, *in yarn spinning*; grain, *in measuring mass*; indirect yarn numbering system; lea, *in linen yarns*; linear density; metric count; run, *in the American woolen system*; tex; worsted count; yarn number; and yarn numbering system.

3.2 Refer to Terminology D123 for definitions of other terms used in this standard.

4. Conversion Factors for Equivalent Yarn Numbers

4.1 Calculate any equivalent value using the appropriate factor listed in Table 1.

4.2 For more information related to how tex size tolerances are determined and used to assign ticket sizes for sewing thread, see Practice D3823.

5. Use of Previously Calculated Equivalent Yarn Numbers

5.1 For a specific number in a stated system, read the equivalent in the various other systems from Table 2.

5.2 With a few exceptions, fractional traditional indirect counts have been omitted from Table 2; the rounded tex system

[1] These tables are under the jurisdiction of ASTM Committee D13 on Textiles and are the direct responsibility of Subcommittee D13.58 on Yarns and Fibers.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Excerpts from SI10, Standard for Use of the International System of Units (SI): The Modern Metric System can be found in the *Annual Book of ASTM Standards*, Vols 07.01 and 07.02. The standard is available as a separate publication and appears in its entirety in Vol 14.02.

[4] Available from American National Standards Institute (ANSI), 1180 Avenue of the Americas, 10th Floor, New York, NY 10036, http://www.ansi.org.

[5] Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, http://www.nist.gov.

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TABLE 1 Conversion Factors for Converting from One Yarn Numbering System to Another[A]

System for Which Yarn Number is Needed		System for Which Yarn Number is Known								
		Tex[B]	Denier	American Grain Count	Cotton Count	Worsted Count	Woolen Run	Metric Count	Linen Lea Woolen Cut	Yd/lb
Tex[B] (g/1000 m)	tex =	...	$\frac{\text{den}}{9}$	$\frac{0.590\ 541}{\times\ \text{gr}}$	$\frac{590.541}{\text{cc}}$	$\frac{885.812}{\text{wc}}$	$\frac{310.034}{\text{wr}}$	$\frac{1\ 000}{\text{mc}}$	$\frac{1\ 653.52}{\text{lea}}$	$\frac{496\ 055}{\text{y}}$
Denier (g/9000 m)	den =	9 × tex	...	$\frac{5.314\ 87}{\times\ \text{gr}}$	$\frac{5\ 314.87}{\text{cc}}$	$\frac{7\ 972.31}{\text{wc}}$	$\frac{2\ 790.31}{\text{wr}}$	$\frac{9\ 000}{\text{mc}}$	$\frac{14\ 881.6}{\text{lea}}$	$\frac{4\ 464\ 492}{\text{y}}$
American Grain Count (grains/120 yd)	gr =	$\frac{\text{tex}}{0.590\ 541}$	$\frac{\text{den}}{5.314\ 87}$	...	$\frac{1\ 000}{\text{cc}}$	$\frac{1\ 500}{\text{wc}}$	$\frac{525}{\text{wr}}$	$\frac{1\ 693.36}{\text{mc}}$	$\frac{2\ 800}{\text{lea}}$	$\frac{840\ 000}{\text{y}}$
Cotton count (840 yd lengths/lb)	cc =	$\frac{590.541}{\text{tex}}$	$\frac{5\ 314.87}{\text{den}}$	$\frac{1\ 000}{\text{gr}}$	...	$\frac{\text{wc}}{1.5}$	$\frac{\text{wr}}{0.525}$	$\frac{0.590\ 541}{\times\ \text{mc}}$	$\frac{\text{lea}}{2.8}$	$\frac{\text{y}}{840}$
Worsted count (560 yd lengths/lb)	wc =	$\frac{885.812}{\text{tex}}$	$\frac{7\ 972.31}{\text{den}}$	$\frac{1\ 500}{\text{gr}}$	1.5 × cc	...	$\frac{\text{wr}}{0.35}$	$\frac{0.885\ 812}{\times\text{mc}}$	$\frac{\text{lea}}{1.866\ 67}$	$\frac{\text{y}}{560}$
Woolen run (1600 yd lengths/lb)	wr =	$\frac{310.034}{\text{tex}}$	$\frac{2\ 790.31}{\text{den}}$	$\frac{525}{\text{gr}}$	0.525 × cc	0.35 × wc	...	$\frac{0.310\ 034}{\times\ \text{mc}}$	$\frac{0.187\ 5}{\times\text{lea}}$	$\frac{\text{y}}{1\ 600}$
Metric count (1000 m/kg)	mc =	$\frac{1\ 000}{\text{tex}}$	$\frac{9\ 000}{\text{den}}$	$\frac{1\ 693.36}{\text{gr}}$	$\frac{\text{cc}}{0.590\ 541}$	$\frac{\text{wc}}{0.885\ 812}$	$\frac{\text{wr}}{0.310\ 034}$	...	$\frac{\text{lea}}{1.653\ 52}$	$\frac{\text{y}}{496.055}$
Linen lea (300 yd lengths/lb)	lea =	$\frac{1\ 653.52}{\text{tex}}$	$\frac{14\ 881.6}{\text{den}}$	$\frac{2\ 800}{\text{gr}}$	2.8 × cc	$\frac{1.866\ 67}{\times\ \text{wc}}$	$\frac{0.187\ 5}{\times\ \text{wr}}$	$\frac{1.653\ 52}{\times\ \text{mc}}$	...	$\frac{\text{y}}{300}$
Yards per pound (yd/lb)	y =	$\frac{496\ 055}{\text{tex}}$	$\frac{4\ 464\ 492}{\text{den}}$	$\frac{840\ 000}{\text{gr}}$	840 × cc	560 × wc	1600 × wr	$\frac{496.055}{\times\ \text{mc}}$	300 × lea	...

[A] The conversion factors are based on the following relationships given in Metric Practice SI 10SI10: 1 yard = 0.9144 m, exactly, and 1 lb (avoirdupois) = 0.453 592 37 kg, exactly. The conversion factors in Table 1 containing fewer than six significant digits are exact values.

[B] Multiples and submultiples of this basic unit may be used as a convenience to avoid large numbers or decimal fractions. For example, decitex (dtex) or tex × 10 is suitable for fine yarns and fibers; millitex (mtex) or tex × 1000 is suitable for fibers; while kilotex (ktex) or tex/1000 is often used for ropes, cords, rovings, tops, and slivers.

Examples of Table 1 use:

1) The English worsted count equivalent to a cotton count of 10 is 1.5 times 10, or 15 English worsted count.
2) The cotton count equivalent to 30 tex is 590.54 divided by 30, or 19.7 cotton count.

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values for most fractional traditional indirect counts can be obtained by interpolation.

6. Implementation of the Tex Yarn Numbering System

6.1 In Table 2, to encourage the implementation of the tex system in the United States, rounded tex values were chosen to accommodate as many yarn numbers as possible for the traditional yarn numbering systems without encroaching on established tolerances. In addition to the rounded tex system values, the decitex (dtex) equivalents have been included because they can be used throughout most of the count range without employing decimal fractions. The choice of unit is entirely a matter to be determined by each sector of the trade; decitex, for example, is particularly suitable for fine yarns (whether spun or filament) and tex for medium and coarse yarns.

7. Derivation of Data in Table 2

7.1 Tables 1 and 2 are based on the following exact equivalents:

7.1.1 1 yd = 0.9144 m.

7.1.2 1 lb = 453.592 37 g.

7.1.3 1 lb = 7000 grains.

7.2 The following conversion factors have been computed where y = yards per pound.

7.2.1 Woolen run (wr) = $y/1600$.

7.2.2 cotton count (cc) = $y/840$.

7.2.3 denier (den) = 4 464 492$/y$.

7.2.4 Worsted count (wc) = $y/560$.

7.2.5 American grain count per 120 yd (gr) = 840 000$/y$.

7.2.6 linen lea (lea) = $y/300$.

7.2.7 metric count (mc) = $y/496.055$.

7.2.8 tex (tex) = 496 055$/y$.

7.2.9 For the *woolen* system, use the column and row headed *linen lea*.

7.3 The data in Table 2 was derived using the National Institute of Standards and Technology values in the NIST Circular M121, January, 1936. Based on current values, when calculating yards per pound for a specified denier, the table will understate the value by 12 yd out of 4.5 million yd or 11 m out of 4.1 million m. When calculating yards per pound for a specified tex value, the table will understate the value by 5 yd out of 0.5 million yd or 4.6 m out of 0.46 million m. Therefore, those who need more precise data for denier and tex should recalculate the data needed using the current values in Table 1.

8. Keywords

8.1 yarn number; yarns per pound

TABLE 2 Equivalent Yarn Number Conversion Table

NOTE 1—In any row with a boldface type number, the other equivalents are computed from the boldface value to the nearest four significant figures.

Exact Equivalent	yd/lb for Rounded Tex-Value[A]	Cotton Count	Indirect Systems				Direct Systems				Deviation[B]
			Worsted Count	Woolen Run	Linen Woolen Cut	Metric Count	American Grain Count	Denier	Rounded Value	Rounded Value	
dtex	yd/lb	cc	wc	wr	lea	mc	gr	den	tex	dtex	%
1.111	4 465 000	[C]	[C]	[C]	[C]	[C]	0.188	1.00	0.11	1.1	−1.0
1.333		[C]	[C]	[C]	[C]	[C]		1.2	0.13	1.3	−2.5
1.444		[C]	[C]	[C]	[C]	[C]		1.3	0.14	1.4	−3.1
1.667		[C]	[C]	[C]	[C]	[C]		1.5	0.17	1.7	+2.0
1.889		[C]	[C]	[C]	[C]	[C]		1.7	0.19	1.9	+0.6
2.000	2 232 000	[C]	[C]	[C]	[C]	[C]		1.8	0.20	2.0	0.0
2.222		[C]	[C]	[C]	[C]	[C]	0.376	2.00	0.22	2.2	−1.0
2.444		[C]	[C]	[C]	[C]	[C]		2.2	0.24	2.4	−1.8
2.556		[C]	[C]	[C]	[C]	[C]		2.3	0.26	2.6	+1.7
2.778		[C]	[C]	[C]	[C]	[C]		2.5	0.27	2.8	+0.8
3.000		[C]	[C]	[C]	[C]	[C]		2.7	0.30	3.0	0.0
3.333		[C]	[C]	[C]	[C]	[C]		3.00	0.33	3.3	−1.0
3.556		[C]	[C]	[C]	[C]	[C]		3.2	0.36	3.6	+1.2
4.000		[C]	[C]	[C]	[C]	[C]		3.6	0.40	4.0	0.0
4.111		[C]	[C]	[C]	[C]	[C]		3.7	0.41	4.1	−0.3
4.444		[C]	[C]	[C]	[C]	[C]		4.00	0.44	4.4	−1.0
4.667		[C]	[C]	[C]	[C]	[C]		4.2	0.47	4.7	+0.7
5.000		[C]	[C]	[C]	[C]	[C]		4.5	0.50	5.0	0.0
5.555	893 000	[C]	[C]	[C]	[C]	[C]	0.941	5.00	0.56	5.6	+0.7
6.111		[C]	[C]	[C]	[C]	[C]	0.9406	5.5	0.61	6.1	−0.2
6.667		[C]	[C]	[C]	[C]	[C]		6.00	0.67	6.7	−0.5
7.778		[C]	[C]	[C]	[C]	[C]		7.00	0.78	7.8	+0.3
7.889		[C]	[C]	[C]	[C]	[C]		8.00	0.89	8.9	+0.1
10.00	496 055	[C]	[C]	[C]	[C]	[C]	1.693	9.00	1.0	10	0
11.00	450 959	[C]	[C]	[C]	[C]	[C]	1.881	10.00	1.1	11	−1.0
12.22	413 379	[C]	[C]	[C]	[C]	[C]		11	1.2	12	−1.8
13.33	381 581	[C]	[C]	[C]	[C]	[C]		12	1.3	13	−2.5
15.56	310 034	[C]	[C]	[C]	[C]	[C]		14	1.6	16	+2.8
16.67	291 797	[C]	[C]	[C]	[C]	[C]		15	1.7	17	+2.0

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TABLE 2 *Continued*

Exact Equivalent	yd/lb for Rounded Tex-Value[A]	Cotton Count	Indirect Systems				Direct Systems				Deviation[B]
			Worsted Count	Woolen Run	Linen Woolen Cut	Metric Count	American Grain Count	Denier	Rounded Value	Rounded Value	
dtex	yd/lb	cc	wc	wr	lea	mc	gr	den	tex	dtex	%
20.00	248 028	[C]	[C]	[C]	[C]	[C]	3.387	18.00	2.0	20	0
22.22	225 480	[C]	[C]	[C]	[C]	[C]	3.763	20.00	2.2	22	−1.0
25.56	190 790							23	2.6	26	+1.7
27.78	177 162							25	2.8	28	+0.8
30.00	165 352	196.8	295.3	103.3	551.1	333.3	5.080	27.00	3.0	30	0
31.11	160 018							28	3.1	31	−0.4
33.33	150 320	177.1	265.7	93.00	496.0	300.0	5.645	30.00	3.3	33	−1.0
35.56	141 730							32	3.5	35	−1.6
38.89	124 014							35	4.0	40	+2.8
40.00	121 191	147.6	221.4	77.51	413.4	250.0	6.774	36.00	4.0	40	0
44.44	112 740	132.9	199.3	69.75	372.0	225.0	7.527	40.00	4.4	44	−1.0
45.00	110 200	131.2	196.8	68.89	367.4	222.2	7.620	40.50	4.5	45	0
47.78	103 345							43	4.8	48	+0.5
49.21	100 800	120.0	180.0	63.00	336.0	203.2	8.333	44.29	4.9	41	+1.6
50.00	99 211	118.1	177.2	62.01	330.7	200.0	8.466	45.00	5.0	50	0
50.04		118									−0.1
50.91	97 266	116							5.1	51	+0.2
51.35		115									+1.3
51.80	95 395	114							5.2	52	+0.4
52.22								47			−0.4
52.72	93 595	112							5.3	53	+0.5
53.68		110									−1.3
54.68	90 192	108							5.5	55	+0.6
50.91		116.0	174.0	60.90	324.8	196.4	8.621	45.82	5.1	51	
53.69		110.0	165.0	57.75	308.0	186.3	9.091	48.32	5.4	54	
55.00		107.4	161.1	56.37	300.6	290.9	9.314	49.50	5.5	55	
55.56		106.3	159.5	55.81	297.7	180.0	9.406	50.00	5.6	56	+0.8
55.71	88 581	106							5.6	56	+0.5
56.24		105									−0.4
56.78	87 027	104							5.7	57	+0.4
57.78								52			+0.4
57.89		102									+0.2
58.00	85 527								5.8	58	0
59.05	84 077	100.0	150.0	52.50	28.00	169.3	10.00	53.15	5.9	59	−0.1
60.00		98.42	147.6	51.67	275.6	166.7	10.16	54.00	6.0	60	0
60.26	82 676	98							6.0	60	−0.4
61.10		96.64	145.0	50.74	270.6	163.7	10.35	55.00	6.1	61	0
61.51		96									+0.8
62.16	80 009	95							6.2	62	−0.3
62.22								56			−0.4
62.82	78 739	94							6.3	63	+0.3
64.18	77 509	92							6.4	64	−0.3
65.00		90.85	136.3	47.70	254.4	153.8	11.01	58.50	6.5	65	0
65.61	75 160	90.00	135.0	47.25	252.0	152.4	11.11	59.06	6.6	66	+0.6
67		88.59	132.9	46.51	248.0	150.0	11.29	60.00	6.7	66.66	
67.10	74 038	88							6.7	67	−0.1
69.47	71 892	86							6.9	69	+0.7
69.47		85									+0.8
70.00	70 865	84.36	126.5	44.29	236.2	142.29	11.85	63.00	7.0	70	0
70.30		84									−0.4
72.01	69 867	82							7.1	71	−1.4
72.22	68 897	81.98	122.7	42.94	229.0	138.5	12.23	65.00	7.2	72	−0.3
73.82	67 034	80.00	120.0	42.00	224.0	135.5	12.50	66.44	7.4	74	+0.3
74.75	66 141	79							7.5	75	+0.3
75.00		78.74	118.1	41.34	220.5	133.3	12.70	67.50	7.5	75	4
75.07		78.67	118.0	41.30	220.3	133.2	12.71	67.57	7.5	75	4
75.16		78.57	117.9	41.25	220.0	133.0	12.73	67.65	7.5	75	4
75.62		78.10	117.1	41.00	218.7	132.2	12.80	68.06	7.6	76	4
75.71	65 270	78.00	117.0	40.95	218.4	132.1	12.82	68.14	7.6	76	+0.4

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