

"Straight Line" Textile Calculations

By Samuel S. Dale

Textile calculations relating to yarn and cloth are based on a few standards of measurement for length, area and weight. Volume or cubic content is not involved.

Units of Length and Area

The inch and the yard are the standards used for measuring length and area.

Length. 1 yard=36 inches.

Area. 1 square yard=1296 square inches.

Units of Weight

1 pound=16 ounces=256 drams=7000 grains.

1 ounce = 16 drams=437½ grains.

1 dram =27 11/32 grains.

1 pennyweight=24 grains.

Numbering Yarn.

The size of yarn is indicated by the ratio or relation between length and weight. This relation is expressed either by the *length of a fixed weight*, as in the case of cotton yarn, of which the count or number indicates the number of 840 lengths per pound; or by the *weight of a fixed length*, as in the case of thrown silk, of which the count indicates the number of drams in the weight of 1,000 yards.

Unless otherwise stated, the count refers to the yarn as spun, or to the silk in the gum. For example, a finished cloth is said to be made of 3-run yarn if the size of the yarn was 3 runs when it came from the mule. The denier or dram count of silk yarn indicates the count of raw silk before boiling-off.

When expressing the count of ply yarn the number indicating the size is preceded by the number indicating the ply or strands of which the yarn is composed, the two figures being separated by a line. For example, "2/40s cotton" indicates a 2-ply thread composed of two strands of single No. 40 cotton yarn. This is the method used for all kinds of spun yarn, wool, cotton, linen, etc., except spun silk.

The exception in numbering spun silk yarn consists in placing the count first and having it indicate the size, not of the single yarn, but of the ply yarn. Thus "15/2 spun silk" indicates that the yarn is 2-ply and that the 2-ply yarn is equivalent to No. 15, the count of the single strand being No. 30. In like manner "10/3 spun silk" indicates that three strands of single 30s yarn have been twisted together, making the 3-ply equivalent to No. 10.

The two methods of indicating the size of yarn correspond to the two methods of indicating the weight of cloth, which is expressed either by the yards per pound, corresponding to the fixed weight system, of yarn counts, or by the ounces per yard, corresponding to the fixed length system of yarn counts. Thus "10s" applied to worsted yarn indicates length of one pound of yarn in hanks of 560 yards each, and "7-yard" applied to cotton cloth indicates the length in yards of one pound of cloth. On the other hand "5 dram" applied to thrown silk indicates the weight in drams of 1,000 yards of silk yarn; and "15 ounce"

applied to woolen cloth indicates the weight in ounces of one yard of cloth.

By the first or fixed weight method the finer the yarn the greater is the length in a fixed weight, and, consequently, the larger will be the size number.

By the second or fixed length method the finer the yarn the less will the weight of the fixed length be, and, consequently, the smaller will be the size number.

In manufacturing loose masses of textile fibers like cotton, wool, flax, etc., into yarn the material is first converted into a heavy sliver, which each successive operation makes finer. Each operation results in an increase on the length of the fixed weight. Yarn manufactured in this way is usually numbered by the length of a fixed weight.

Silk, on the contrary, is finest at the first stage when spun by the silk worm. In this form it is a very fine filament, of which one pound may measure 1,100 miles in length. In this form it is far too delicate for weaving. It must be made heavier and stronger, which is done by doubling and twisting a number of these silk cocoon filaments together.

Each successive process in the manufacture of raw silk into silk yarn makes the thread coarser. The length of the original filament remains the same. The processes of doubling thus increase the weight of a fixed length and silk yarn is numbered by the weight of a fixed length to indicate the varying weight.

Thus this size number grows larger for both spun yarn and silk as the process of manufacturing advances, although spun yarn becomes finer, and silk yarn coarser.

Silk waste comes to the manufacturer in the form of a loose, tangled mass of fibers and the yarn made from it is numbered, like cotton and woolen yarn, by the length of a fixed weight.

Following are the principal standards employed for numbering yarn by the length of a fixed weight:

	Material	Standard	
Anglo-American	Woolen	1600	yards 1 pound
World	Cotton	840	" 1 "
Anglo-American	Worsted	560	" 1 "
World	Linen	300	" 1 "
West of England	Woolen	320	" 1 "
Yorkshire	Woolen	256	" 1 "
England	Raw silk	16	" 1 "
Anglo-American	Yarn of all kinds	1	" 1 "
France	Cotton (1000 meters per ½ kilo)	992	" 1 "
Continent, metric	Woolen, worsted and spun silk (1000 meters per kilo)	496	" 1 "

The principal standards for indicating the size of yarn by weight of a fixed length are:

	Material	Standard
World	Silk	deniers per 400 aunes
	Silk	drams per 1000 yards
Anglo-American	Cotton	grains per 120 yards
	Various	grains per 100 yards
	Woolen	grains per 50 yards
	Woolen	grains per 25 yards
	Woolen	grains per 20 yards
World	Jute	pounds per 14,400 yards

There are many standards employed locally on the Continent of Europe and in other parts of the world, but they are slowly being displaced by those given above.

The above table of fixed weight systems of numbering yarn gives the length of one pound of No. 1 yarn for each, but they can also be expressed by the length of any other unit of weight. Thus the run system indicates not only the number of 1600-yard lengths per pound, but also the number of 100-yard lengths per ounce.

IMPORT LICENSES IN ENGLAND.

(Continued from previous page)

- (13) Gas mantles and mantle rings.
- (14) Magnetos.
- (15) Hosiery, needles, latch.
- (16) Gauges.

This plan to protect British industry by the licensing and exclusion of imports can be profitably studied by those American manufacturers who think that we should admit German dyestuffs into the United States, subject only to the regular tariff rates.