Unleash Your Imagination

YLI Corporation
1-800-296-8139 • www.ylicorp.com

A THREAD OF TRUTH

A factual look at sewing thread

Unleash Your Imagination

A Thread of Truth

A factual look at sewing thread

In the world of sewing, specifically home sewing, nothing is as misunderstood as thread. The vast array of fibers alone is enough to be confusing to the average home sewer, add to that sizing, S-twist vs. Z-twist, spun vs. filament and it is enough to baffle even the most knowledgeable "expert". The purpose of this booklet is simply to provide the factual information you need to make informed choices.

COMMON TYPES OF THREAD

Raw Materials

The earliest sewing threads were made from either animal or vegetable products and while most of these natural fiber threads are still very popular, threads made from man-made or synthetic fiber have become increasingly popular in recent years.

NATURAL FIBERS
- Animal - wool, silk, hair
- Vegetable - cotton, flax, jute

REGENERATED
- Cellulose - rayon, acetate

MAN-MADE
- Mineral - glass, metallic
- Synthetic - polyester, nylon, acrylic, elastic, polypropylene

HOW IS THREAD MADE?

All sewing threads begin as simple yarns. Twisting together short fibers or continuous filaments produces these yarns. This process known as “singling twist” is responsible for the strength and flexibility, which is essential in any good sewing thread. When two or more yarns are combined to make the thread, a “reverse twist” is applied to add balance. Without

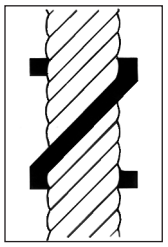
a reverse twist, the thread cannot be controlled during sewing. The individual yarns or plies would separate as they pass through the needle and the tensions discs of the sewing machine.

Twist

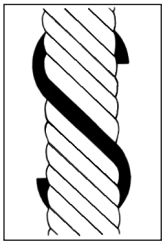
Twist is simply the number of turns per cm or inch put in the thread. A thread with too little twist may fray and break, one with too much twist can cause snarling, looping and knotting. Balance is the key and a good sewing thread has it.

Twist Direction

As threads pass through a sewing machine some additional twist may be added. For this reason the direction in which the thread is twisted becomes important. A thread with a Z-twist, or left twist, is engineered specifically for the sewing machine. The action of the sewing process tends to increase the twist of a Z-twisted thread, but can actually untwist a thread with S-twist, or right twist.



“Z” twist for ply yarn



“S” twist for single strand yarn

Ply

The number of component yarns that are twisted together to produce a thread is the ply. Two-ply threads, therefore, are simply two yarns which have been twisted together.

Thread finishing

After construction, the thread is finished to enhance its suitability for various sewing uses.
- SOFT - No further processing to change its physical characteristics. It is only dyed and lubricated.

- MERCERIZED - In this process cotton thread is treated in a caustic solution under controlled tension. This causes the fibers to swell, resulting in a greater affinity for dyeing. Mercerization also increases the luster and adds some strength.
- GASSED - Passing cotton thread through a flame at high speed to reduce the fuzz is known as gassing. This process also produces a higher sheen.
- GLAZED - This is a process in which cotton threads are treated with starches and special chemicals under controlled heat and then polished to a high luster. The glazed process results in a thread with a hard finish that protects the thread from abrasion and enhances ply security.
- BONDED - Treating continuous filament nylon or polyester with a special resin that encapsulates the filaments is called bonding. The result is a tough smooth coating that adds significantly to the thread's ability to resist abrasion and greatly enhances ply security.

THREAD TYPES

Spun Threads

Throughout most of the twentieth century, cotton thread was the standard sewing thread both industrially and in the home. When synthetics were developed, it was only natural to attempt to emulate the sewing characteristics of cotton. Spun polyester thread, made from polyester fibers cut to the same length as cotton staple, was introduced as a substitute for cotton. All spun threads are made up from staple fibers that are spun into single yarns and then plied to make a sewing thread. Mettler's all-purpose polyester, Maxi-Lock®, Elite Premium Serger Thread®, Gutterman® and all cotton threads are examples of spun thread.

Twisting together yarns made from short fibers, as we learned earlier, produces all spun threads. However the staple lengths of the fibers utilized can have an important effect on the quality, strength,

and performance of the thread produced. As a general rule of thumb, the longer the staple length of the fibers, the better the quality of thread produced. YLI Quilting threads and Mettler's cotton threads are examples of cotton threads produced with long staple cotton. The highest quality spun polyester, such as Mettler® and Gutterman® are produced from longer staple fibers.

Spun threads will have a more "fuzzy" surface, which gives them a soft hand and good lubricity characteristics. They offer excellent sewing performance, but lack the strength of continuous filament threads.

Core Spun Threads

This process seeks to achieve the strength of continuous filament threads with the sewing performance of spun thread. Core spun thread features a continuous filament polyester core covered with cotton or polyester fibers. Two or more of these composite yarns are then twisted to form the thread. The most common examples are Dual Duty® and Signature®.

Continuous Filament Threads

This process begins by extruding individual filaments of synthetic material. A singling twist is applied to these unbroken, continuous fibers. They are then brought together and a finishing twist is applied. The result is a strong, consistent sewing thread. The most common examples are most rayon and polyester embroidery threads and YLI's Ultrasheen®.

Textured Threads

This process adds texture to the parallel continuous filaments of synthetic yarns, creating softness and bulk. The textured filaments are then twisted slightly and heat set. These threads provide excellent coverage for seams and rolled edges. Textured threads are typically used in the loopers of a serger or over locker. Woolly Nylon® is the best example of textured thread.

Monofilament Thread

This is a single synthetic filament extruded to a specific diameter. They are available in a number of sizes, .004 and .005 being the most popular for the home sewer. Wonder Invisible Thread® and Sulky's® invisible thread are good examples.

THREAD SIZING

There is a great deal of confusion and misinformation regarding the size of sewing thread and how we communicate size to one another. Over the years no clear standard has evolved that is universal in the home sewing market. Our intent here is to give you universal standards by which you can compare thread sizes from one manufacturer to another, spun polyester to filament silk, or even cotton to rayon.

Common Thread Sizing Standards

In the industrial sewing thread market, the Cotton Count System (NEc) has been the accepted standard utilized in sizing spun threads and the Denier System(Td) has been the accepted standard for filament threads. Over the last several years there has been a great deal of support to adopt an universal standard under which all sewing threads can be sized and will be understood world wide regardless of the thread's construction. The TEX System is that standard for industrial sewing thread.

The TEX system will be used as the standard in this booklet. Once you understand how the various standards, (such as cotton count, or denier) relate to TEX, you will be able to relate the thread one manufacturer calls a number 50 to a 40/3 ply from another.

Until the TEX system, or some other standard, is adopted for home sewing thread, confusion will exist. However, we hope the information here will help.

SIZING SYSTEMS

All threads can be produced in different thicknesses and the "size" of a particular thread is the relationship of its length to its weight. This relationship of length to weight is known as linear density, yarn count, or size. There are many sizing systems used, but they generally fall into two classifications:

Fixed Weight

These systems use the length of yarn that make up a given weight.

NEc (Cotton Count) - For Spun Threads - This is the number of hanks (840 yds.) of yarn it takes to equal 1 pound.

- A cotton count of "1" means 840 yards of yarn weigh 1 pound.
- A cotton count of "2" means 1680 yards (840x2) weigh 1 pound.

EXAMPLE: If you had a single strand of yarn 840 yards long weighing one pound, its count (or size) would be shown as 1/1. This simply means it had a count of one (the first number) and that it was a single strand of yard (the second number).

If you then twisted two of those single strands together, the size would then be 1/2: One count yarn (the first number), in a two ply construction (the second number).

Equivalent Size - The same size thread can be constructed using different count yarns by varying the number of plies. All the following threads are physically the same size.

- 30/2
- 45/3
- 60/4

To determine the equivalent size, simply divide the yarn count by the number of plies. All three of these threads have the equivalent size of 15.

IN FIXED WEIGHT SYSTEMS, THE HIGHER THE NUMBER - THE FINER THE YARN.

Fixed Length

These systems use the weight of a given length.

Td (Denier count) - For Continious Filament Threads - This is the weight in grams per 9,000 meters.

Tex (TEX) - This is the weight in grams of 1,000 meters. (1 Tex = 1 gram per 1,000 meters)

IN FIXED LENGTH SYSTEMS, THE HIGHER THE NUMBER - THE THICKER THE YARN.

THREAD WEIGHT

Another popular size measurement system, particularly in embroidery thread is "Thread Weight". Since most embroidery thread is a two-ply construction it is generally believed that "Thread Weight" equals the count number (the first number) as in the Cotton Count System.

- 40/2 = 40 count, 2 ply = 40wt.
- 30/2 = 30 count, 2 ply = 30wt.

Unfortunately, this only works for two-ply threads. For example, a 40/3 quilting thread is not a 40wt. thread.

40/3 Cotton
40 ÷ 3= 13.33 equivalent

The same size in a two-ply thread would be 26.67 or a 26.67 weight.

Filament embroidery threads (i.e.: rayon and polyester) are typically measured in denier, so to determine "Thread Weight" the denier size of the thread must be converted to cotton count.

Cotton Count = 5315 ÷ denier
120 denier two-ply rayon embroidery thread = 44.29 cotton count = 40wt.
150 denier two-ply rayon embroidery thread = 35.43 cotton count = 35wt.
180 denier two-ply rayon embroidery thread = 29.53 cotton count = 30wt.

The Tex System is designed to overcome much of this confusion and inconsistencies.

THE TEX SYSTEM

As we indicated earlier, the Tex system will be used in this brochure as the standard sizing system. It was chosen for two reasons: first, because metric designations are used worldwide, and Tex is a metric system. Second, since Tex is a direct numbering system, logical size numbers are assigned... the finer the thread, the smaller the size number assigned, and the coarser the thread, the larger the number.

In order to reduce the sheer volume of sizing numbers that could be assigned, the Tex sizes are bracketed. All sizes falling into a particular bracket receive the same Tex number. The number assigned is always the smaller bracket number. For example a Tex 42 thread would be labeled a Tex 40 thread. The following chart details the brackets that make up the Tex system.

Tex #	[10.0 - 11.9]	= Tex 10	Tex #	[35.0 - 39.9]	= Tex 35
Tex #	[12.0 - 15.9]	= Tex 12	Tex #	[40.0 - 49.9]	= Tex 40
Tex #	[16.0 - 17.9]	= Tex 16	Tex #	[50.0 - 59.9]	= Tex 50
Tex #	[18.0 - 20.9]	= Tex 18	Tex #	[61.0 - 79.9]	= Tex 60
Tex #	[21.0 - 23.9]	= Tex 21	Tex #	[80.0 - 89.9]	= Tex 80
Tex #	[24.0 - 26.9]	= Tex 24	Tex #	[90.0 - 104.9]	= Tex 90
Tex #	[27.0 - 34.9]	= Tex 27			

Thread Size Comparison

In order to make comparisons as understandable as possible, the following chart breaks thread into three major classifications:
Heavy weight threads: Tex 40 - Tex 90
Medium weight threads: Tex 27 - Tex 35
Light weight threads: Tex 10 - Tex 24
The threads used in the following chart are only examples to help you establish a basis of understanding. All you need to know is the cotton count or denier to convert any thread size to Tex.

To convert cotton count to TEX
Divide the cotton count (the equivalent size) into 590.5 $\left(\frac{590.5}{\text{c.c}}\right)$

To convert denier to TEX multiply denier by .1111 (d x 0.1111)

Heavy Weight Threads

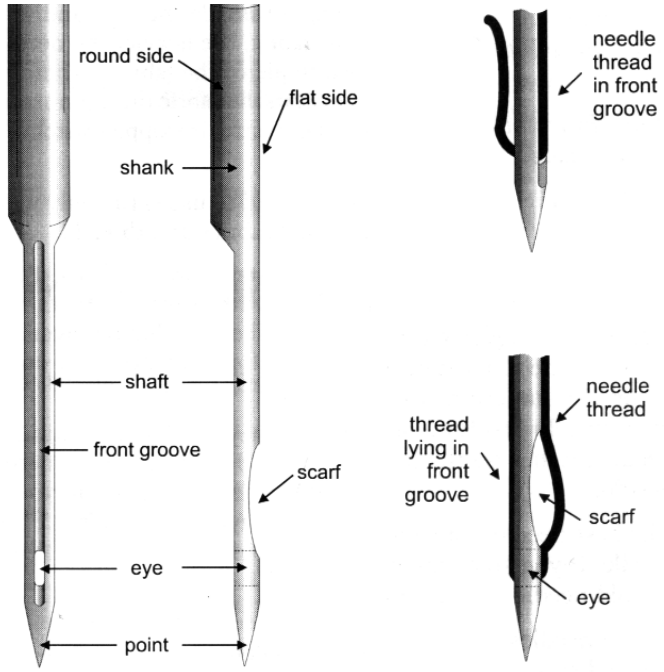
Thread type	Cotton Count	Denier	Tex Number	Tex Size
YLI Jeans Stitch	18/3		98	90
YLI Silk # 30		567	63	60
YLI Colours	30/3		59	50
YLI Quilting	40/3		44	40
Mettler Quilting	40/3		44	40
Gutterman Quilting	40/3		44	40
Signature Cotton Quilting	40/3		44	40
Sulky #30 rayon		360	40	40

Medium Weight Threads

Thread type	Cotton Count	Denier	Tex Number	Tex Size
Mettler, all purpose poly	50/3		35	35
Gutterman, all purpose poly	50/3	318	35	35
Coats Dual Duty, poly/cotton	35/2	300	33	27
YLI Silk #50		243	27	27
YLI Select, cotton	40/2		31	27
Finishing Touch, #35 rayon		300	33	27
Elite	60/3		29	27
Maxi-Lock	42/2		28	27

Light Weight Threads

Thread type	Cotton Count	Denier	Tex Number	Tex Size
Sulky rayon #40		240	26	24
R&A,rayon #40		240	26	24
Mettler PolySheen		240	26	24
Woolly Nylon		220	24	24
Mettler cotton	60/2		19	18
YLI Heirloom	70/2		16	16
Madeira cotton	80/2		14	12
YLI Heirloom	100/2		11	10
YLI Silk #100		124	12	12



SEWING NEEDLES

You may wonder what a section on needles is doing in a brochure about thread, but the relationship between needle and thread is crucial to successful sewing or quilting. As important as it is to select the proper needle for the fabric, it is equally important to select the proper needle for the thread you are using. Very often thread breakage, skipped stitches or other "thread" problems are the result of damaged or improper needle selection.

Selecting the proper machine needle

Proper needle selection is determined by two key factors: 1) the thread to be used and 2) the fabric to be sewn or quilted.

- Select the thread to match the fabric or the project
- Next, select the needle type best suited for the fabric used
- Finally, select the needle size to match the thread. The thread must lay in the front groove without sitting on top or wobbling in the groove.

The eye must be large enough for the thread to pass through with minimal friction in order to create a perfect stitch.

- Always start with a new needle

Machine Needles

Parts of Machine Needles *(Illustration Previous Page)*

- **Point** - One of the main differences between needles is the type of point. The point type is the most important consideration in regards to the fabric you will be using.
- **Eye** - The eye is the hole through which the thread passes and is therefore extremely important to thread selection.
- **Shank** - This is the part that is inserted into the machine.
- **Shaft** - The body of the needle itself or how thick the needle is.
- **Scarf** - This is the indentation in the back of the needle. Important because this is where the stitch is formed. When the bobbin shuttle swings into the scarf it hooks into the looped needle thread to form the stitch.
- **Front Groove** - The front groove allows the needle thread to lay close to the needle as it travels down the needle towards the bobbin. The deep groove of some needles helps protect the thread from friction created when the needle pierces the fabric. If the needle is too fine for the thread being used, stitch faults may occur.

Machine needles range in size from 60/8 (very fine) to 120/19 (heavy duty). The higher number relates to the needle's shaft diameter in metric, the lower number to a U.S. system, which also relates to shaft diameter.

- **Universal** - A general-purpose needle that can be used on woven fabrics as well as knits. They come in 60/8 to 120/18.
- **Jeans / Denim** - Designed for densely woven and heavily finished fabrics. It features a very stiff shaft, sharp point and slender eye. It is a great choice for getting perfectly straight stitches. Sizes range from 70/10 to 110/18.
- **Jersey / Ballpoint** - This needle is designed to be used on knits. Its rounded point slips between the fibers rather than cutting them. From 70/10 to 120/18.
- **Stretch** - This needle has a slightly more rounded point than a universal needle. There is a tiny hump between the eye and scarf that allows the thread to make a large loop on one side of the needle. This loop makes it easy to complete a stitch. They come in sizes 75/11 or 90/14.
- **Quilting** - These needles have a thin, tapered deep point, which is good for sewing multiple layers. They come in sizes 75/11 or 90/14.
- **Microtex** - With a thin shaft, and a slim, sharp point, these needles are the right choice for lightweight fabrics, delicate wovens and any heirloom sewing. Sizes range from 60/8 to 100/16.
- **Topstitch** - This extra sharp needle is less rounded than the universal. The eye is twice as long and the front grove is deeper. This is a good choice when using heavier threads without piercing large holes in the fabric. Sizes 70/10 to 100/16.
- **Embroidery** - Designed to work with embroidery threads, this needle has a large eye and a special scarf that protects more fragile threads. Sizes range from 75/11 to 90/14.
- **Metallica** - These needles are designed specifically for metallic and flat decorative threads. The eye is double sized and Teflon coated, the front groove is deep and the scarf is longer. Sizes 80/12 or 90/14.

Thread/Machine Needle Chart

Spun Thread	Tex	Needle Selection
70/2 ply	Tex 16	Universal 70/10, Embroidery 75/11, Microtex 70/10
60/2 ply	Tex 18	Universal 70/10, Embroidery 75/11, Microtex 70/11
50/3 ply	Tex 35	Universal 70/10 - 80/12, Jeans 80/12, Quilting 75/11
40/2 ply	Tex 27	Universal 70/10 - 80/12, Quilting 75/11
40/3 ply	Tex 40	Universal 80/12, Sharp 80/12, Embroidery 90/14
30/2 ply	Tex 35	Top Stitch 90/14, Embroidery 80/12, Jeans 90/14
30/3 ply	Tex 50	Top Stitch 90/14, Quilting 90/14, Embroidery 90/14
Jeans Stitch	Tex 90	Denim 90/14, 100/16, Embroidery 90/14

Synthetic Thread	Tex	Needle Selection
Rayon # 40	Tex 24	Embroidery 75/11- 80/12
Poly #40	Tex 24	Embroidery 75/11- 80/12
Rayon/Poly #30	Tex 40	Embroidery 90/14
Metallic	Tex 24	Metallica or Metafil 80/12, Embroidery 90/14

Filament Silk	Tex	Needle Selection
#100	Tex 12	Microtex 70/11, Embroidery 75/11
#50	Tex 27	Universal 80/12, Embroidery 80/12 - 90/14
#30	Tex 60	Top Stitch 90/14, Embroidery 90/14

Hand Sewing Needles

Unlike machine needles, hand needle sizes are backwards: the higher the number the smaller the diameter and the shorter the length.

- **Basting** - This needle is curved to make basting and tying quilts easy.
- **Beading** - These are very long with a small eye. They range in size from 10 to 15.
- **Chenille / Silk Ribbon** - With large eyes and sharp points these are often used for silk ribbon embroidery Sizes range from 18 to 24.

- **Crewel** - These have a sharp point with a long narrow eye. They are used with embroidery floss, silk ribbon and heavier fabrics. Size 1 to 10.
- **Darning** - These are large needles with very large eyes. Wool darners are used when working with heavy fibers, wide ribbons and wool darning yarns. Sizes 14 to 19 for wool - 1 to 9 for cotton.
- **Majestic 88** - These are English needles with a special coating allowing easy stitching through cotton batting or difficult - to - needle fabrics. Sizes 9, 10, & 12.
- **Milliners** - These are long, narrow needles with a small round eye. They are used in Baltimore Applique, as well as sewing beads and French knots. They range in size from 3 to 9.
- **Betweens** - These short, fine needles with large eyes are most frequently associated with quilting, but are also used for fine hand sewing. Sizes 3 to 12.
- **Sharps** - Fine, medium length needles most commonly used for hand sewing and are also used in fine hand embroidery. They range in size from 5 to 12.
- **Tapestry** - These are stout needles with a long eye and a blunt point. They are used for pulled and drawn work and silk ribbon embroidery. Sizes 13 to 28.

WHAT MAKES A GOOD THREAD?

This may seem like the $64,000 question, but in general all good sewing threads have in common good sewability, good seam performance and in the case of decorative threads, aesthetics. Several characteristics contribute to these attributes and are regularly measured and monitored by most thread manufacturers.

- **Elongation** - This is the amount a thread stretches before it breaks. Threads with high elongation will give greater seam elasticity, but can cause poor loop formation leading to excessive skipped stitches and thread breakage. The elon-

gation of a sewing thread is determined by fiber type but can also be controlled by drawing and heat setting of synthetics such as polyester and nylon. Cotton thread has very little, if any, elongation.

- **Uniformity** - Imperfections or defects in thread are thick and thin places that can cause sewing problems. The most common imperfections are: knots, slubs, neps, dropped ply, dropped filament and singles kinks. Obviously the fewer the better.
- **Ply Security** - This is a thread's ability to stay together during the sewing process. The most common type of thread break is caused by a loss of ply security. If the plies open up during the sewing process they are much more susceptible to breaking.
- **Lubricity** - This is the frictional characteristic of thread as it passes through the sewing machine and into the seam. The soft "fuzzy" characteristic of cotton thread and spun polyester actually gives these threads greater lubricity and better sewability than continuous filament threads.
- **Strength** - The amount of force required to break a thread. This characteristic can be measured several ways: **Breaking Strength** - force applied to each end of the thread until it breaks, measured in pounds. **Loop Strength** - when one strand of thread is looped with another strand and then broken, also measured in pounds. **Tenacity** - the breaking strength of a thread adjusted for thread size. Tenacity is measured in grams/denier.

  Thread made from continuous filaments are generally stronger and have higher tenacity than threads made from staple fibers.
- **Twist** - A thread with too little twist may fray and break, one with too much can cause snarling, looping and knotting.

(NEXT PAGE)

Thread breaks can be caused by a number of variables including:

- Using the wrong thread for the application
- Incorrect needle or damaged needle
- Thread defects
- Too much elongation
- Being sewn with too much tension
- Worn machine parts
- Machine out of adjustment
- Operator handling

COLORFASTNESS

The ability of a thread to retain its color during normal use is its *colorfastness*. There are several variables that are measured.

- **Wash Fastness** - the ability to resist color change after laundering.
- **Crock Fastness** - Refers to rubbing off of color. Crocking is checked both wet and dry.
- **Sublimation** - This relates to the loss of color due to heat. Certain dyes will change from a solid to gas when exposed to high heat and will redeposit elsewhere.
- **Cold Water Migration** - This refers to the possibility of staining when light colored fabric is combined with stronger colored thread and left wet for a period of time.
- **Light Fastness** - In this test, samples are exposed for prolonged periods of time to daylight.

While synthetic threads are generally more colorfast than cotton or rayon, keep in mind some thread types may be colorfast to some variables and only moderately colorfast to others.

ALL THREAD IS NOT CREATED EQUAL

Hopefully you now understand how thread is made, the things to look for in a good quality thread, how to compare the various sizes to one universal standard, and the importance of the needle to sewing performance. Now, in order to effectively compare one thread to another you need to ask the manufacturer for the appropriate information.

- **Tex Size**
- **Tenacity, Loop Strength, and/or Breaking Stength**
- **Color Fastness**
- **Raw Material** - Spun or Filament Yarn
- **Type of Finish**
- **Construction**

We fully realize this may be more information than you ever wanted to know about thread, but we hope you will take what you need and use it to make informed decisions.

Note: Research materials published by American & Efird, Coats & Clark, Celenese, In Cahoots, and Threads Inc. were used in writing this brochure. Every effort has been made to produce a non-biased, factual brochure. Any oversights or omissions are purely accidental.

GLOSSARY

A

Abrasion: The act or result of surface rubbing during laundering or normal wear. Synthetic threads have superior abrasion resistance to cellulose threads.

Acid Dyes: Dyes used to dye nylon threads. There are two classes of acid dyes that are used: premetalized and regular acid dyes. Premetalized dyes have superior colorfastness characteristics but can produce a limited color range.

Aesthetics: Refers to the appearance of the thread in the finished seam that can be effected by contrast stitching, color matching, the sheen of the thread or the size of the thread.

B

Backtacking: Refers to the reverse feed sewing at the beginning and ending of the seam to prevent the thread from unraveling.

Basting: Refers to temporary stitching to hold pieces together until another operation is performed.

Bobbin: A bobbin is a small spindle that is inserted into the hook of lockstitch sewing machines. Sewing machine bobbins can be wound by the sewer or pre-wound bobbins can be purchased.

Bonded Finish: Refers to a finish applied to continuous filament nylon and polyester threads which coats the fibers, giving the thread better ply security and abrasion resistance.

Bottom Thread: Refers to the under thread in a stitch formation, usually called a bobbin thread.

C

Cellulose Fiber: A fiber made from plants or a wood pulp by-product. Cellulose fibers include cotton and rayon. These fibers have similar physical properties in that they have a relatively low tenacity, a low elongation, and good heat resistance. They are not as durable to abrasion, laundering, and chemicals as polyester or nylon fibers.

Colorfastness: The ability of the thread to retain its color during normal use, laundering, and/or when exposed to sunlight. Colorfastness variables include wash fastness, crock fastness, sublimation, cold-water migration and light fastness. Some thread types are relatively fast to some variables and only moderately fast to others.

Continuous Filament: Refers to synthetic fibers of an indefinite length. Fibers used to manufacture sewing threads are either continuous filament or staple. Continuous filament nylon, polyester, and rayon can be used to make various thread constructions. The five thread constructions produced from continuous filaments include monofilament, twisted multifilament, monocord, textured, and air entangled. Core spun threads use a combination of continuous filament polyester core and a staple cotton or polyester wrapper. The sizing system for continuous filaments is the denier system.

Core or Core Spun Thread: A thread construction made by wrapping a cotton or polyester staple wrapper around a continuous filament core of polyester. Two or more of the core yarns are then plied to make a core spun sewing thread.

Crocking: Refers to the rubbing off of color. Crocking is checked both dry and wet using ASTM D-204 Test Method. Excessive crocking can be caused by poor dye penetration of the thread or a thread that has not been properly scoured and has residual dye on the surface.

D

Decorative Stitching: The sewing of thread to accent a pocket, collar, or some other part of the garment. Usually, this thread is a different color than the body fabric.

Defect: Refers to a quality imperfection found in the thread. Thread defects include: slubs, knots, neps, slack twists, corkscrew twists, and single kinks.

Denier: Refers to a sizing system used for continuous filaments. Denier is the gram weight of 9000 meters of sewing thread. Denier is 9 times the Tex Size.

E

Elasticity: Refers to how much a seam will stretch before the thread ruptures or "cracks". Usually, threads with higher elongation will give greater seam elasticity. Also, stitch formations that use more thread will have greater seam elasticity like over-edge and coverstitch seam constructions. The number of stitches per inch and the stitch balance can also effect seam elasticity.

Elongation: Refers to the amount that a thread stretches before it breaks. Threads with high elongation provide greater seam elasticity but can cause poor loop formation leading to excessive skipped stitches and thread breakage. The elongation of a sewing thread is determined by

the fiber type used but can also be controlled by drawing and heat setting of synthetic sewing threads like polyester and nylon.

Embroidery: The sewing of thread in a small area with numerous stitches. If a high sheen is desired, a filament rayon, tri-lobal polyester, or acrylic thread is recommended. If a high sheen is not necessary, cotton, wool blends, etc. can be used.

F

Fadeometer: A lab-testing machine used to test long-term effects of light on sewing thread color and strength.

Finishes: Refers to various treatments of cotton threads including soft, mercerized, and glazed. "Soft" refers to thread that is simply spun or twisted and then dyed and wound on a cone. "Mercerized" refers to the process where cotton is submerged in a caustic soda bath under tension and then neutralized in an acid bath. The end result is a greater affinity for dyes and a higher tenacity thread. “Glazed” is a process whereby cotton threads are passed through a solution of starches and/or waxes and then polished between brushes to give a very uniform surface. Continuous filament threads are also available in various finishes including "soft" and "bonded". "Soft" again refers to thread that is simply twisted together, dyed and wound on cones with a thread lubricant. “Bonded” refers to an additional process where a coating is put on the continuous filament thread to give it better ply security and abrasion resistance. Finish also refers to the thread lubricant applied to the thread to give the thread good lubricity characteristics and needle heat resistance. Two methods are commonly used to apply finish to sewing threads: the "kiss-roll" method and the "in-bath" method.

Flagging: Refers to a sewing problem caused by the fabric moving up with the needle as the needle rises from the bottom of its travel causing poor loop formation and leading to skipped stitches or thread breakage.

Fluff Threads: Refers to texturized polyester or nylon threads. These threads provide excellent seam coverage when sewn in serger or overlock machines.

G

Gassing: Refers to a finishing process where 100% cotton thread is passed through a flame at high speed to reduce its fuzz and give it a greater sheen.

Glaze Finish: Refers to a finish put on 100% cotton threads made from starches, waxes or other additives. This coating is then brushed to give the thread a smooth surface. A glaze finish protects the thread during sewing giving better ply security and abrasion resistance.

Greige Yarn: Refers to thread before it has been finished with dye, lube, or other finishes.

H

Hue: The characteristic of color described by the terms red, blue, yellow and green, etc. (White, gray, and black have no hues and are referred to as neutrals.)

K

King Spool: A thread cone that has a vertical tube with a horizontal base.

Knots: Used to join ends of yarn or thread together.

Most textile companies use "weavers" knots, or air splices. Most knots will cause the thread to break but most air splices will sew through the needle without breaking.

L

Lockstitch (301 Stitch): A stitch that is formed with a needle thread and a bobbin thread that is inter-locked in the center of the seam being sewn. Even though the same amounts of needle and bobbin thread are consumed, the needle thread requires 5 to 7 times more tension than the bobbin thread. Some of the advantages of using a lockstitch in a seam include: the stitch is reversible, produces the tightest of all seams, and uses the least amount of thread.

Loop Strength: The strength when one strand of thread is looped with another strand and then broken. This strength test gives an indication of the brittleness of the fiber being tested. Most polyester sewing threads will have loop strength of approximately 1.5 times the single-end breaking strength.

Looper: A stitch-forming device used on sergers or overlock sewing machines to form a stitch.

Looper Thread: Refers to the bottom thread used on a serger or over-lock machine, and the threads that cover the edge of an over-edge seam. Looper threads feed directly off the cone into the sewing machine eliminating bobbin changes.

Lubricity: Refers to the frictional characteristics of thread as it passes through the sewing machine and into the seam. Good lubricity characteristics will minimize thread breakage and enhance sew ability.

M

Mercerizing: Refers to a process where 100% cotton thread is treated under tension in a solution of caustic soda, which removes some of the sugars and makes the cotton fibers more uniform. This allows the fibers to accept dyes more readily, enhances luster and increases the thread strength or tenacity. Mercerization was originally done to make 100% cotton threads look more like silk threads.

Monofilament Thread Construction: Refers to a thread construction produced from a single continuous filament. Usually, monofilament threads are used because the thread is translucent and blends in with many colors.

Multifilament Thread Construction: Refers to a thread construction produced from continuous filaments of polyester or nylon, which are twisted together into a cohesive bundle and then plied to make the thread. They are then dyed, stretched, and heat set to achieve the desired physical characteristics.

N

Natural Fibers: Fibers whose origin is from plants or animals. The most common natural fibers used for sewing thread include cotton and rayon. Other natural fibers that are used for seaming include silk, wool, linen, and jute.

Needle: The primary stitch-forming device used on all sewing machines to carry thread through a seam. Needles have nine parts including butt, shank, shoulder, blade, groove, scarf, eye, point, and tip. Needles come in a variety of types and sizes depending on the type of sewing machines and the sewing application.

Needle Size: Refers to the diameter of the needle measured at the needle eye. Today the most common needle sizing system used around the world is the metric system. The metric number represents the percent of a millimeter. Common needle size application:

Light weight, 60 - 70
Medium weight, 75 - 110
Heavy weight, 100 - 120

P

Ply or Plies: Refers to the number of singles yarns twisted together to make a sewing thread. Most core and spun sewing threads have either two or three ply constructions. The ply twist is normally a "Z" or left twist compared to an “S” or right twist in the singles yarns.

Ply Security or Ply Adhesion: Refers to a sewing thread's ability to stay together during the sewing process. The most common type of thread break is caused by a loss of ply security. When the plies open up during the sewing process they are much more susceptible to breaking and causing an unraveled type of thread break.

Polyester: A synthetic fiber made from a chemical composition of diethyl terephthalate and ethylene glycol. The polyester is melted, extruded through a spinneret, and drawn. It can be different tenacities and be fully oriented (FOY) or partially oriented (POY) depending on how it is processed. Usually, sewing threads are made from FOY fibers. (Fiber brands: Dacron®, Trevira®, Fortrel®, Kodel®)

Pre-Wound Bobbins: Refers to bobbins that are wound by the thread supplier. From 15 to 20% more thread can be wound by precision winding equipment than by a sewing operator using a sewing machine bobbin winder.

Puckering: Refers to the wrinkled appearance of a seam, which can be caused by a number of factors including: 1) Structural jamming, 2) Tension puckering, and 3) Feed puckering.

Put-Up: Refers to the type, size, and yardage of the cone, king-tube or tube upon which thread is wound.

R

Rayon: Refers to a regenerated cellulose fiber similar to cotton in its physical characteristics. Rayon is primarily used today for embroidery applications.

S

Seam: According to Federal Spec 751a entitled "Stitches, Seams & Stitching", a seam is a series of stitches used to join two or more plies of fabric together.

Seam Failure: Caused by either fabric failure or thread failure.

Seam Strength: A measurement of the load required to rupture a seam. Wovens are tested using a "jaws" method and knits are tested using a "ball-burst" test method. The five major contributors to seam strength include: 1) Fabric type and weight; 2) Thread type and size; 3) stitch and seam construction; 4) Stitches per inch; and 5) Stitch balance.

S.E.B. (Single-End Break): Refers to the single-end breaking strength of the thread or tensile strength when stress is applied across a single

strand of thread until it ruptures. S.E.B. is usually measured in pounds, ounces, or grams.

Selvedge: Refers to the edge of woven fabrics running along the warp direction of woven fabrics that will not unravel.

Sewability: Ability to sew without skipped stitches or having the thread break. Several factors effect sew ability: improper needle size, wrong thread size, excessive tension, needle heat, worn or defective sewing machine parts, and improper machine settings. Thread likewise plays a key role in sew ability. Factors in thread sew ability include elongation, uniformity, ply security, lubrication, strength, and twist construction.

Shade Matching: Refers to the selection of a thread color that is close to the fabric color it is being sewn into but not necessarily a color match.

Shrinkage: Refers to the dimensional stability of a thread when it is subjected to boiling water or heat. ASTM Test Method D204 describes the standard test procedures for sewing thread using either the boiling water (BW) or dry heat (DH) method. Dry heat shrinkage at 350°F is more severe than boiling water shrinkage. During this test, the thread is subjected to 350°F for 30 minutes with a weight-attached equal to one gram per Tex Size.

Singles Equivalent Size: Refers to the yarn size divided by the number of ply. (Example: 40/2 yarn has a 20 equivalent size, 60/3 yarn has a 20 equivalent size.)

Singles Yarn: Refers to the individual yarn that is spun prior to twisting. Most threads are made by taking two or more singles yarns and twisting them together.

Skipped Stitches: Refers to malformed stitches that are caused when a stitch-forming device misses its appropriate loop. On chain stitch and overedge machines, skipped stitches can unravel allowing the seam to fail.

Slack Twist: Refers to a yarn imperfection where insufficient twist is applied to the thread so it has very poor ply security.

Slubs: Refers to yarn imperfections found in spun or core-spun threads that resemble cocoons. They are caused by fibers in the air getting caught into the yarn as it is being spun.

Soft Finish: Refers to thread that receives no further processing to change its general physical characteristics. It is dyed to the proper shade and wound with a thread lubricant on a cone.

Spinneret: A showerhead looking device used in the melt-spinning process for making polyester or nylon that helps determine the size of the filaments.

Spinning: The process used to produce singles yarns where staple fibers are drafted down to their final size and twisted together. Most singles yarns are twisted in the "S" direction.

Spun Thread Construction: Thread made from cotton or polyester staple fibers that are spun into single yarns and then two or more of these yarns are plied to make a sewing thread. Spun threads have a fibrous surface giving them a soft hand and good lubricity characteristics.

Spun Polyester: Refers to a thermoplastic thread made from staple polyester fibers, which are spun into singles yarns and then plied into a thread.

Staple: Small fibers or various lengths, with crimp in them, used to spin yarn or sewing thread. When twisted together, the crimp locks the fibers together increasing the strength of the thread. Spun threads have the following characteristics: 1) Fibrous or fuzzy surface contributing to a soft hand, low sheen and good lubricity characteristics; 2) Lower tenacity than continuous filament constructions.

Stitches Per Inch: Refers to the number of the stitches made in one inch of seam, starting at a needle penetration and measuring the lengths of thread between needle penetrations.

Stitching: According to Federal Spec 741a entitled "Stitches, Seams & Stitching", a stitching consists of a series of stitches used to decorative stitch or hem a single ply of fabric.

Stitch Balance: Refers to the balancing of the sewing machine tension systems so that a proper stitch is formed. Generally, it is desirable to balance the stitch with minimum sewing machine thread tension.

Sublimation: A term relating to the loss or migration of color due to heat. Certain dyes when exposed to high heat will change from a solid to a gas and then redeposit somewhere else.

Synthetic Fibers: They are made from various chemicals or regenerated from cellulose such as wood pulp and cotton waste. Examples are polyester and nylon, which are synthesized from petro-chemicals and then melt-spun into either continuous filament or staple fibers.

T

Tenacity: A term relating to the strength per size of a thread and is generally measured in grams per denier. Threads made from continuous filament fibers are stronger and have a higher tenacity than threads made from staple fibers.

Tex Size: Refers to a sizing system of sewing thread that is based on the gram weight of 1000 meters of greige (undyed) thread. Tex sizes are bracketed or rounded off to a smaller size. (Example: a Tex 42 thread would be labeled a Tex 40 thread.) The Tex size is 1/9 the denier size.

Textured Thread Construction: Refers to threads that have been textured to entangle the parallel continuous filaments. The textured filaments are then twisted slightly and wound on dye tubes for dyeing. After the thread is dyed, it is then wound on cones with a low friction thread lubricant. Textured or "fluff" threads provide excellent seam overedge when used on a serger or over-lock machine.

Thread Size: Many different thread size systems are used in the world for sewing threads. Generally, the thread size refers to the diameter or thickness of the thread. The Tex Size system can be used universally for all of its thread products. Other thread size systems used include the Cotton Count System; the Metric System, the Denier System and the Silk System used for both Silk and Mercerized Cotton threads.

Torque: When twist is applied to thread, torque is created. These torque forces are balanced by using opposite twist in the singles and ply twist. Heat setting the thread during dyeing or autoclaving will also minimize the torque forces in the thread. Excessive torque can cause the thread to "French-knot" or kink excessively.

Twist: In thread construction, twist refers to the number of turns around the axis. The direction of the twist can be an "S" or "Z" direction. Most sewing threads are ply twisted with a "left" or "Z" twist. Generally, sewing threads are made with a "Z" twist because most sewing machine stitch forming devices enter the needle loop from the right-hand side and this reduces the unplying of the thread during sewing.

Twist Balance: The absence of torque in sewing thread. See torque.

Twist Per Inch (TPI): Refers to the turns per inch used to spin the singles yarn and ply twist. Usually the twist is determined by a twist multiple. Constructing a thread with the right amount of singles and ply twist enhances sew ability and seam appearance.

Twisted Multifilament Thread Construction: Thread made from continuous filaments of polyester or nylon that are twisted together into a cohesive bundle and then plied to make the thread.

U

Ultraviolet Light (UV) Resistance: Refers to the light rays that can effect the durability and color fastness of a thread. Sometimes a UV inhibitor is used to reduce the amount of harmful rays absorbed by the thread. Some fibers react differently if they are exposed under glass versus direct sunlight.

W

Wash Fastness: The ability to resist color change after laundering.

Weatherometer: A testing machine used to expose thread to accelerated weathering conditions and measure its effect on color fastness, strength and other physical characteristics.

Y

Yarn Imperfections: Refers to yarn defects that usually either cause thick or thin places in the thread that can cause sewing problems. Some of these yarn imperfections include: knots, slubs, neps, dropped ply, dropped filament, singles kinks, etc.

NOTES:_____